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ABSTRACT

Descriptive and evaluative information is provided in this report on Project COMPAS (Consortium for Operating and Managing Programs for the Advancement of Skills), a cooperative effort between seven community colleges which developed cognitive skills programs for entry-level freshmen. Chapter I reviews the unique features of Project COMPAS, including: (1) the use of Piagetian theory for structuring classroom activities; (2) the use of the Learning Cycle technique, which involves concept presentation and exploration; concept development; and application of learning; and (3) an interdisciplinary approach to curriculum development. After chapter II traces the history of the project, chapter III describes the programs developed at each of the seven schools in terms of site characteristics, administrative support, program design, student recruitment, and program maintenance. Chapter IV highlights the findings of a qualitative and quantitative evaluation of the project, which sought to assess effects on students' skills and cognitive development. Chapter V contains statements by site directors, faculty, and the project evaluator on Project COMPAS, and chapter VII offers a paper on the future of Piagetian programs and suggests strategies for ensuring their survival. Appendices include overviews of Piagetian theory and the Learning Cycle technique, comments on program strengths and weaknesses, sample publicity materials, a faculty directory and a bibliography. (AYC)

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COMPAS

A Design for Change

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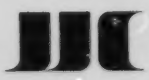

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A design for change

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PREFACE

This text summarizes the results from an unusual cooperative effort between seven community colleges. The theme of the project and many of the tangible results are described in the pages which follow. Somehow, in reviewing the program description, the evaluative information, and the personal reflections, I think many of the significant results are difficult if not impossible to explain because they are quite subtle. For instance, many faculty and students reexamine their basic educational values. For faculty, the project asks..."What does teaching really mean? How do students learn in the classroom and how can classroom experiences be organized to assist lasting learning?" For students, the questions take the following form..."What classroom role is important for me as a learner? How can I tell when I have really learned something new? For my learning, what should I expect to share or exchange with my teachers or other classmates in a profitable classroom experience?"

These questions are difficult. They are so much so, we often retreat from dealing with them directly or conscientiously. As a result, our teaching or learning is based upon what we have done in the past. Thus, learning and teaching in an environment filled with these kinds of questions can be quite frustrating. But in my estimation, this concern and questioning describes what occurred for many faculty and students. Thus, the quantitative results we present here seem to fall short of illustrating what has occurred in the project.

Since 1976, six faculty and approximately 25 project students per year have been involved with DOORS (Development of Operational Reasoning Skills) at Illinois Central College. After two years of operation and the completion of an optimistic evaluation, COMPAS (Consortium for Operating and Managing Program for the Advancement of Skills) was begun. In this dissemination effort, six additional community colleges were selected to develop programs with ICC acting as a resource base. This effort resulted in seven cognitive programs offered in the fall of 1981 with over 200 project students and 40 faculty involved.

One unique feature of the project design was the use of Piagetian ideas for structuring classroom activities, which provided a sense of direction and a way of communicating between students, instructors and project leaders. Instructors who utilized the methods found a new way of viewing student behavior. Students relied less on textbook answers but more on fellow students and classroom experiences for learning. The unusual interdisciplinary communication allowed project faculty a systematic method for identifying and planning new classroom activities.

The results of the COMPAS project are offered in hopes they will meet the needs of a variety of individuals. The following is a partial list of those so identified:

* College faculty who wish to reexamine their own teaching and philosophy of learning.

* Groups of college faculty who wish to work co-operatively to improve teaching/learning.

* College administrators interested in faculty development.

* College curriculum officers interested in alternative programs for beginning college students.

* Academic officers who are interested in inter- or intra-faculty cooperation.

We know the descriptions offered here cannot adequately serve such a wide audience. If additional information is needed, please contact any individual connected with the project for more specific information. The list provided on the inside front cover should allow you to receive the information you need quickly.

Finally, I would like to thank all of those who were in some way involved in project COMPAS. Many students, courageous faculty and understanding administrative personnel should be commended for their participation and encouragement. In addition, those who devoted extra time to the construction of this text--thank you for your efforts. And finally, we acknowledge the Fund for the Improvement of Post Secondary Education, without whose support this project would not have been possible.

Thomas Campbell
COMPAS Project Director
Illinois Central College
1982

TABLE OF CONTENTS

CHAPTER 1: A BEGINNING . . . . . 1 - 8

CHAPTER 2: PROJECT HISTORY . . . . . 9 - 14

CHAPTER 3: SITE REPORTS . . . . . 15 - 50

CHAPTER 4: EVALUATOR'S REPORT . . . . . 51 - 74

CHAPTER 5: REFLECTIONS

SITE DIRECTORS . . . . . 75 - 81

FACULTY . . . . . 82 - 94

EVALUATOR . . . . . 95 - 101

CHAPTER 6: SURVIVAL OF PIAGETIAN PROGRAMS . . . . 103 - 114

APPENDICES:

A. PIAGET IN A NUTSHELL . . . . . 115 - 119

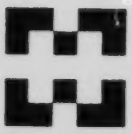
B. LEARNING CYCLE . . . . . 121 - 123

C. COMMENTS ON PROGRAM'S STRENGTHS & WEAKNESSES. . 125 - 128

D. PROGRAM PUBLICITY . . . . . 129 - 139

E. PROJECT FACULTY DIRECTORY . . . . . 141 - 147

F. SOURCES OF INFORMATION ON PIAGET AND HIGHER EDUCATION 149



1

A BEGINNING

A BEGINNING

. . . for who can change the opinions of men? And without a change of sentiments what can you make but reluctant slaves and hypocrites?

--Marcus Aurelius

Increased frustration and burnout among classroom teachers are well-known and serious phenomena. Several years ago we were frustrated college teachers, frustrated not only with ourselves but also with our students. They couldn't or wouldn't read their textbooks; they had difficulties performing relatively elementary mathematical calculations; and most of their writing assignments were filled with serious errors. Attendance was not good, with most students missing from five to ten class periods per semester. When they did attend, they seemed bored and indifferent toward our subjects. Those students who seemed even slightly concerned had no genuine interest in learning; they wanted to memorize, to learn only what was needed to pass the next exam.

SEARCH FOR CHANGE

Faced with students demonstrating such attitudes, we began to feel bored and burned out after relatively few years of teaching. As a result, we began thrashing around, looking for ways of improving our teaching and motivating students in our respective disciplines, physics, English, and history. We began writing behavioral objectives and using programmed instruction, hoping these changes would make the learning process easier and more interesting than mere lectures. We redesigned classes, inserting more anecdotes and adding audio-visual aids to make the classes run efficiently and smoothly. All of us spent more time "coaching" our classes, allocating more time for conferences and expanding our office hours.

...we began... looking for ways of improving our teaching....

Over the years, we periodically selected new texts, assuming that someone, somewhere was doing a better job of teaching and stimulating his or her students than we were. All these techniques brought some success, but generally we felt little better about our teaching. Although they are important and do improve instruction, these changes now seem rather superficial. As we reflect on them, each provided us invaluable experience in our search for change.

Specifically, these innovations demand that the teacher change, but require little active participation from students. In short, the teacher is generally doing most of the work in the classroom, while the students often become passive recipients of the content conveyed by the teacher. As Robert Fuller, a physicist at the University of Nebraska-Lincoln, has said, these instructional methods perpetuate the feedlot philosophy of education. Teachers keep filling the trough with knowledge (corn), expecting the students to learn (eat) more and more until they are smart enough (heavy enough) to leave and find their places in the world.

...the students often become passive recipients of the content conveyed by the teacher ...the feedlot philosophy of education.

According to this philosophy, the teaching of content is paramount, the process of filling an essentially empty mind with all kinds of miscellaneous data: numbers, words, dates, formulas, causes, effects, and the like. Rarely are students asked to apply or integrate what they have learned in a realistic context; they quickly find that memorization will provide success in passing exams. As a result, students develop sophisticated oral skills which convince themselves and their teachers that everything memorized and regurgitated is worth knowing and applicable.

IN PURSUIT OF PIAGET

As we continued our study of learning, we began exploring the work of Piaget and others, trying to find something from their research which could be applied to college students. Like Piaget, we began to query students about why they were or weren't able to internalize

and grasp concepts. When we talked sincerely to individual students, we discovered why they could not grasp the major ideas presented in many of our lectures: the students seemed to lack a basic background in the concepts. Many physics students had difficulties in completing simple electrical circuits because they had never taken a light bulb apart. During frank discussions, the English instructor found his students couldn't write classification papers because they didn't really know how to classify.

Working together, reviewing our experiences, and studying Piaget, we realized the need for a new and different view of the teaching/learning process. We recognized that students must share similar concrete experiences before being introduced to new concepts. Thus, we teachers must become relatively passive, and the students must become actively involved in the classroom. Instead of memorizing broad generalizations formulated by the teacher, the students arrive at their own preliminary conclusions after evaluating concrete experiences set up by the instructor.

...instead of memorizing generalizations ...students arrive at their own...conclusions ...

For example, when this methodology was utilized to teach the concept of diminishing returns in economics, the teacher began the instruction with a specific experience which all the students could share. At the front of the classroom, he placed a small table with a stack of plain white paper and several pencils. Next, he called one student to the table to make "widgets," hypothetical products made by folding the paper in a prescribed manner and drawing an X on it. As the class recorded the number of widgets made per minute, more and more students came forward to the table to make them, and the number of products produced within a minute rose considerably. However, after a certain point, when too many people were trying to make widgets at the same time and at the same table, the total production began to fall.

In short, the students themselves had explained and illustrated the concept which their teacher wanted them to know.

When the time came for a test, the students did not have to recall some abstract definition of diminishing returns; they could explain the concept based on their concrete experience with it in the classroom. They could function with the concept because their "knowing" was not based on memorization but a real concrete experience.

In a sense, this example from an economics class illustrates how we have tried to reorient our instruction. When human beings learn outside the classroom, they do so by grappling with puzzling concrete situations and come to their own conclusions after participating. Throughout the first few years of elementary school, teachers use a great deal of similar hands-on instruction, but by about fourth or fifth grade most teaching becomes abstract and passive. Apparently, someone decided that at this point students are capable of grasping knowledge without reference to shared concrete experience and of understanding abstract concepts formulated or discovered by someone else, teachers, researchers, or authors.

...their "knowing" was not based upon memorization but a real concrete experience.

As a result, after about third grade, school becomes boring because all the life, the real experience, has been squeezed out of it. What often remain are the broad abstractions printed in textbooks. Without the correct prerequisite set of experiences, however, many students quickly gain success through memorization. This technique clouds the internalization process and hinders students' ability to use concepts in new situations.

THE LEARNING CYCLE

For assistance in adapting Piaget's developmental model, we turned to Robert Karplus' instructional technique called the Learning Cycle, which involves the careful selection and presentation of content. According to Karplus, a Berkeley physicist, our first task was to look at our individual courses and decide what was needed for the internalization of a concept, what common experiences our students have had and which ones need to be provided, and how we could design a classroom atmosphere to produce openness and interaction.

With these questions in mind, we began to create a Learning Cycle with three distinct parts.

1. We designed a concrete exercise for presenting a concept, like the one used to teach diminishing returns in economics. Students were asked to analyze that situation and to draw some kind of conclusion from the shared experience of making widgets.

2. Following this exploration stage, we held a discussion based upon the shared concrete experience in the first step, something which might be called concept development. At this point the students had the opportunity to discuss their reactions to the situation and to explain their responses, right or wrong. Because the students had the chance to speak out, the teachers had a clear understanding of why students were or were not learning. At the same time, students were more prepared, more motivated for the discussion about the concept.

3. The final step involved some kind of application of learning -- the students were asked to apply what they had learned in a new situation rather than to respond to the typical true/false or multiple choice exam.

For instance, in a physics class the teacher began a unit on normal distribution with an experiment in which students recorded where steel balls landed after rolling down a tube and falling on a sheet of graph paper. After the discussion of this experiment, the students demonstrated their knowledge of normal distribution by measuring the size of leaves or the circumference of eggs and recording that data as they had done with the balls.

...almost all ... teachers can apply these methods to their own instruction.

Obviously, almost all classroom teachers can apply these methods to their own instruction. In fact, Learning Cycles have been written for all these courses: literature, composition, history, sociology, psychology, physics, mathematics, philosophy, political science, geography, and chemistry.

The learning cycle is relatively easy to adapt to certain areas like the sciences because concrete experiences are readily available, while they are difficult in philosophy and literature because the exercises are not readily available and are hard to imagine. However, these abstract subjects are just the ones needing specific, hands-on experiences for students to understand the concepts.

As teachers try to cover more material each year, partly because of the information explosion, they are forced to be more and more general; consequently, the students must deal with an increasing stream of abstractions. They have little or no opportunity to grope through concrete experiences and arrive at their own conclusions.

...the change to a passive role in the classroom was psychologically difficult for us who had always thought that good teaching and lecturing were synonymous.

SECOND THOUGHTS

Such changes in our teaching and in our students' learning did not come without struggle. For instance, we had to sacrifice content. It obviously takes much longer for a teacher to design an experiment for students in economics than to lecture about the concept of diminishing returns. Since students needed time to grope through the specifics and arrive at their own conclusions, some content had to be left out. As a result, we became haunted by fears of guilt: Would our students suffer from the gaps we were leaving in their education? How could they ever live happy, successful lives without knowing about the Elastic Clause or memorizing Newton's laws of motion? Moreover, the change to a passive role in the classroom was psychologically difficult for us who had always thought that good teaching and lecturing were synonymous. Without the lectures, it became difficult to anticipate what would happen each day in class. Students began asking questions which we could not answer, and we often had to admit our ignorance.

But teaching became exciting again. With this new method, the class structure was less rigid than in a lecture setting.

The first step in the Learning Cycle is inductive and appears very similar to discovery learning, but the teacher establishes parameters to prevent the class from moving into irrelevant matters common to discovery learning. This controlled openness required us to accept some noise, movement, and other minor disturbances in the classroom as well as group work, raising still more questions. When students learn together, are they doing their own work? Is group learning valid?

ACROSS THE DISCIPLINES

As we said before, the learning cycle can be used in a single classroom, but it is much more effective in a program involving several faculty and a number of courses from several disciplines. When a group of teachers work together, they provide support for each other, sympathizing with each other's problems and offering constructive criticism. Meeting on a weekly basis, we found that the historian, for example, received more productive ideas from the physicist than from colleagues in history. Because of their broad and deep understanding, individuals within a discipline are often unaware of problems which a bright colleague in another discipline can easily detect.

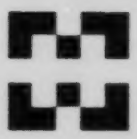
Group work also allowed us to see where the curriculum was out of focus: the math instructor was not teaching certain skills early enough so the students could use them in physics. Or the sociology teacher was asking for certain kinds of writing which the English teacher would not cover for another semester. As a result, we realigned our courses so they complemented rather than contradicted each other. This analysis of the curriculum allowed us to see and limit repetition and voids in the content, taking advantage of the repetition where helpful, and filling voids where needed.

...we have experienced a new excitement in our teaching.

A BEGINNING

We are still frustrated, but we don't feel burned out. Rather, we have experienced a new excitement in our teaching, not only individually,

but collectively. We believe the techniques discussed here can offer a fundamentally different way of reviewing the teaching and learning process. This approach can assist individual teachers by revealing a unique set of ways to assist student learning. Moreover, the method can provide a basic format for allowing instructors from different disciplines to discuss mutual concerns. We are not suggesting these techniques are the answer -- only a workable alternative and a worthwhile beginning.



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PROJECT HISTORY

DOORS, COMPAS, AND PIAGET

The principal goal of education is to create men who are capable of doing new things, not simply repeating what other generations have done.

-- Jean Piaget

The community college movement in America resulted from a need to provide post-secondary education for more people. These colleges have attracted large student bodies and energetic faculties. On the average, however, the students who enter college transfer programs at local community colleges are not as prepared for baccalaureate work as students entering four-year colleges and universities. To further complicate matters, neither curriculum design nor teaching styles and techniques utilized by community college faculty differ significantly from those found at four-year colleges and universities.

...a program to assist 'high risk'...students to become successful in their college work.

The DOORS (Development of Operational Reasoning Skills) Program was designed to address the problem of low-level reasoning abilities of incoming community college freshmen. Through the support of a grant received from the Fund for the Improvement of Post-Secondary Education (DHEW) in 1976, courses were developed, which together formed a core program, to assist undecided majors and/or "high-risk" community college students to become more successful in their college work.

The project began with an intensive two-day workshop, "Teaching and the Development of Reasoning," led by ADAPT (Accent on the Development of Abstract Processes of Thought) faculty at the University of Nebraska-Lincoln. This workshop was held during the summer of 1976, and introduced the DOORS staff to the basic ideas of Jean Piaget and how his work can be applied to college teaching.

During the fall semester of 1976, the DOORS staff (six teaching faculty and director of counseling) met in a weekly seminar to discuss both the scope and direction of the DOORS project. Although the project was to be patterned after the ADAPT program in Nebraska, the needs of community college students were perceived to be much different. Whereas the Nebraska program required all ADAPT students to enroll completely in the program for an entire year, the DOORS faculty felt this model would not suit the target DOORS population.

After considerable discussion, it was decided the program would be one semester in length and students would be required to enroll in both DOORS English and DOORS Mathematics and then select at least two additional DOORS courses from the following choices: economics, sociology, history and physics. The predicted target population for this program had the following characteristics:

1. Beginning students with undefined career goals,

2. Beginning students with average to just-below-average high school academic records/classwork,

3. Older, returning students who were beginning their college careers.

The weekly seminars proved very productive. At each session, staff members discussed their specific learning cycle plans. As these were presented, other faculty would respond with constructive criticism. The result was two-fold. First, participating faculty felt pressure to continue developing curriculum materials which were parallel with Piaget's model. Second, an interpretation of the content (each knowing what the other had planned) and reasoning required for each classroom experience was a natural occurrence. Through much interaction, a rearrangement of the order of topic presentation by each staff member produced a cohesive curriculum.

...an interpretation of the content and reasoning required for each classroom experience was a natural occurrence.

The DOORS program was first offered to Illinois Central College students on a trial basis in January, 1977. The new program initially attracted a small number of students. However, this slow start allowed the project faculty an opportunity to experiment with newly-developed classroom materials.

During the summer of 1977, the DOORS staff again utilized the seminar method to review and revise their curriculum materials. Through their experience, they realized they were not integrating the DOORS content to make the program interdisciplinary. In reviewing the experience in detail, they realized the program was really "inter-skill" and should be integrated through the parallel use of or emphasis on reasoning skills. Again a thorough review of the materials revealed that this was a most satisfactory method for interrelating various disciplines.

...they realized the program...should be integrated through the parallel use of or emphasis on reasoning skills.

To expedite this reorganization, the DOORS staff identified several major thinking skills basic to the six disciplines; then these skills were arranged in a natural ascending order. Each of the DOORS classes was then redesigned to emphasize these common thinking skills concurrently. Thus, all the DOORS classes emphasize the same skill at the same time in the semester. A brief outline showing this skill identification and emphasis schedule for the first seven weeks of the semester is shown on page 14.

In the fall of 1977, the second DOORS program was offered to thirty-two students. During the semester, each course and the reasoning abilities utilized were carefully monitored. New topics were introduced via these selected skills, which allowed DOORS students to utilize them in at least three classes simultaneously.

The DOORS program has experienced several changes since 1977. Some faculty have left the program and been replaced by new individuals. These personnel changes have necessitated a revision of the courses offered in the program. The English composition course is the only original course that continues to be offered.

The other original courses -- economics, sociology, history, physics, and math -- have been replaced by an introductory social science course (1978), political science (1981), and philosophy (1981). With the reduced number of courses offered, a student now is required to register for only two courses to be classified as a DOORS student.

COMPAS EMERGES

The original idea for COMPAS (Consortium for the Operation and Management of Programs for the Advancement of Skills) grew out of the success and experiences of the DOORS Program at Illinois Central College, and the interest expressed by other community colleges in starting similar programs. The plan called for assisting six additional community colleges in the development of DOORS-type programs. The six colleges involved were: William Rainey Harper College (Palatine, IL), Prairie State College (Chicago Heights, IL), Joliet Junior College (Joliet, IL), Surry Community College (Dobson, NC), Community College of Allegheny County (West Mifflin, PA), and Seminole Community College (Sanford, FL). Illinois Central College (East Peoria, IL) would serve as the resource base for the project.

A grant proposal submitted to the Fund for the Improvement of Post-Secondary Education (FIPSE) for this project was approved in 1979. The proposal called for a two-year project to develop and teach core courses in a freshman program that would emphasize the development of basic cognitive skills. A major goal of each program was to improve the reasoning abilities of the students and, thus, assist them in more successfully pursuing their post-secondary educational goals. Each of the six community colleges involved in the consortium was to receive assistance from the DOORS faculty at Illinois Central College. The programs were to be tailored to meet the specific needs of the individual site colleges, but would retain several features of the DOORS Program: Piagetian-based, designed for entering freshmen, and including some of the DOORS content areas.

...a two-year project to develop and teach core courses in a freshman program that would emphasize the development of basic cognitive skills.

The consortium began with an initial two-and-one-half day workshop for all project personnel. The workshop, conducted by the DOORS faculty, was held at Illinois Central College in December, 1979. This workshop consisted of eleven modules designed to involve each teacher in individual and interactive activities. Together, the activities would serve as an introduction to Piaget's ideas and to their usefulness for developing reasoning abilities, and an aid in the understanding of students' basic abilities. All workshop participants were encouraged to apply their own valuable experiences as college teachers to the improvement of college teaching.

The last half of the workshop concentrated on applications of the Piagetian model. Using this model, individual instructors worked in small groups to plan, write and present a lesson from their discipline. They were assisted by the DOORS faculty. This activity served not only as a valuable experience in applying the cognitive model, but also as a model for faculty to use at their campuses in reviewing and revising lesson materials. Non-teaching personnel (counselors/evaluators) from each site college met with DOORS personnel to discuss student selection, screening and testing procedures. The site directors left the workshop with a commitment to develop a local program which would begin in the fall of 1980.

In seminar settings... classroom materials were developed, and by the fall semester, all sites had instituted a new, cognitive-based program for incoming freshmen.

Individuals participating in the site programs began to meet at their respective colleges during the spring of 1980. In seminar settings, instructors developed classroom materials as well as a structure for an overall program. They also had to gain institutional cooperation and support for their program. The DOORS faculty visited each of the six campuses during the spring of 1980 to assist in these tasks. The recruitment of students for the programs took place during the summer, and by the fall semester, all the sites had instituted a new, cognitive-based program for incoming freshmen.

Reasoning Skill Identification

Week	English, History, Sociology	Math, Economics, Physics
1.	Observation (identification of variables)	Observation (identification of variables)
2.	Description (describing variables)	Description (describing variables)
3.	Comparing or Relating (comparison and contrast)	Comparing or Relating (graphing)
4.	Comparing or Relating (comparison and contrast)	Inferring (graphing)
5.	Classification	Classification
6.	Classification	Separation and Control of Variables
7.	Summary	Hypothesis Statement
8.	Cause and Effect	Separation and Control of Variables
9 - 15.	More Advanced use of Skills	More Advanced use of Skills

3

SITE REPORTS

In addition to Illinois Central College, six other community colleges participated in the COMPAS program. Because these schools differed in their site characteristics and administrative structure, each had the freedom to develop a Piagetian-based program that would fit its individual needs. The only restriction was that the Learning Cycle had to be incorporated into teaching methods used in the classroom. Illinois Central College served as a resource and guide whenever a school encountered any problems.

This chapter will describe the implementation, procedure, and program developed at each of the seven schools. It is divided into five major sections:

1. Site Characteristics
2. Administrative Support
3. Program Design
4. Recruitment of Students
5. Maintaining the Program

Throughout the chapter, each of the seven schools will be denoted by its school logo.

ALLEGHENY COMMUNITY COLLEGE - LIFT Program

HARPER COLLEGE - PATH Program

ILLINOIS CENTRAL COLLEGE - DOORS Program

JOLIET JUNIOR COLLEGE - STEPPE Program

PRAIRIE STATE COLLEGE - RISE Program

SEMINOLE COMMUNITY COLLEGE - STARS Program

SURRY COMMUNITY COLLEGE - CREATE Program

This chapter organization can be used in two different ways:

1. If readers want to follow the development of a program at one school, they can read the material denoted by the appropriate school logo in each section.

2. If this chapter is read in normal fashion, the experiences of the different schools in developing their programs can be compared.

SITE CHARACTERISTICS

The schools in the COMPAS program differed considerably in location, economic profile of area, student enrollment, and student profile.

The South Campus of the Community College of Allegheny County is one of four campuses making up the college system. Each campus is autonomous, with a central administrative staff. The geographic area of South Campus is the suburban area on the south side of Pittsburgh, PA, and the 200-acre campus is situated in the borough of West Mifflin. This area is often called "Steel Valley" because of the heavy concentration of steel-making industries in the area.

The South Campus is but one of four campuses which together serve the greater Pittsburg area.

The campus began in 1968 with mostly college transfer programs, but in recent years there has been a large increase in vocational and technical offerings. At present, about 50% of the students graduate with career degrees. The college's present enrollment is 2,369 full-time equivalent, made up of 1,478 full-time and 2,217 part-time students. Classes are held during the day, evening, and on Saturday mornings. The average student age is 27.6.

Located in the northwest suburbs of Chicago, WILLIAM RAINEY HARPER COLLEGE, Palatine, IL, serves four local townships and an independent unit high school district. Characterized as a middle class to affluent area, the college district is the site of a growing number of small and medium-sized industries and businesses. In addition, the headquarters and/or research and development divisions of a large number of national corporations are located within the district. The median 1979 income for families in the district was $30,000, while the average 1980 income of parents of dependent students was $29,000.

William Rainey Harper College...located in the northwest suburbs of Chicago...serves four local townships...

Harper College offers the first two years of transfer or pre-professional education (54% of declared majors), as well as certificate and degree programs in the technical-vocational areas (46% of declared majors). Continuing education courses and programs (credit and non-credit), Adult Basic Education, ESL, and GED complete the college's offerings.

In fall 1981, the total student enrollment was 22,394, with 19,509 of these students taking credit courses. The number of full-time equivalent (FTE) students is 8819, with 8470 of these enrolled in credit courses. The average age of a traditional credit student is 26½, with 37% of these under 21 years. The majority (56%) of Harper students are female, while only 4% of the traditional credit population are members of minority groups (Latino or Mexican-American, 1.6%; Asian-American, 1.6%; Black American, 0.5%; and Native American, 0.3%). 65% of the traditional credit students are part-time.

ILLINOIS CENTRAL COLLEGE, located in central Illinois, is comprised of most of Peoria, Woodford and Tazewell counties, along with portions of five other counties. The community college district encompasses a little more than 2,000 square miles, thus making it one of the largest districts in the state. The area enjoys a good balance between agriculture and farm-related businesses, and industry, both heavy and light.

Peoria, the largest metropolitan center in the district, serves as the international headquarters for Caterpillar Tractor Company, by far the largest single employer in the area.

The college offers a wide variety of programs and courses. The fall 1981 semester showed an enrollment of close to 15,000 students (6400 FTE). Approximately 40% of these were enrolled in transfer-degree programs. The remaining 60% were pursuing one of the 39 Associate in Applied Science Degrees, or 48 certificate programs.

Illinois Central College...located in Peoria...serves a 2000 square mile district...one of the largest in Illinois.

The student population accurately reflects the economic and geographic characteristics of the district, in that there is a balance between those that live in urban areas (Peoria, East Peoria, and Pekin) and those that reside in rural areas. Approximately 10% of the student body is classified as minority students.

JOLIET JUNIOR COLLEGE is the oldest public junior college in the United States. The main campus is located in Joliet, IL, about 39 miles southwest of Chicago. Most of the 1442 square miles it serves consists of rich farmland. The population of over 325,000 people served by the college consists of mostly blue-collar workers in the many industries in the area. Because Joliet is close to Chicago, many residents commute to the businesses and offices there.

There are 25 high schools in the college district. The college enrolls nearly 10,000 students, 4,095 full-time equivalent. The percentages of male and female students are equal, 50/50, with more married students than single ones. The average age of the students at Joliet Junior College is 27 years 4 months. The number of part-time students is 2.5 times the number of full-time students. Of those enrolled, 29% are taking transfer (baccalaureate) courses, 64% are taking career courses, and 5% are taking general studies courses.

Joliet Junior College... the oldest public junior college in the United States...is located in Joliet, IL.

PRAIRIE STATE COLLEGE is located in Chicago Heights, a community in the south suburban Chicago metropolitan area, approximately 25 miles south of the Chicago Loop. There are sixteen organized municipalities within the college district, which is unique in that it has the fourth wealthiest (Olympia Fields) and the second poorest (East Chicago Heights) within its boundaries. The population of the district is close to 200,000, with almost 5% of the families falling below the $3,600 poverty level defined by the 1970 Census figures. The population of the district can be described as diverse, growing, and everchanging and seems to reflect all the strengths and weaknesses inherent in the nation.

Prairie State College Chicago Heights... located in south suburban Chicago... serves both the wealthy and the poor from within its district.

The educational level of the district also reflects this diversity. Twenty-one percent (21%) of the total population in 1970 had no high school education, while 63% were high school graduates or above.

The fall of 1980 saw an increase in the student population at Prairie State College as well as an increase in credit hours generated. In fall 1981, there was also an increase of about 5% from the previous fall. Fifty-two percent (52%) of the credit-hours generated were in the transfer program, 46% in the vocational program, and 2% in the general interest and continuing education area. Prairie State is similar to other two-year colleges in that 27% of the students are full-time, while 73% are part-time.

SEMINOLE COMMUNITY COLLEGE, a member of the Florida State System of public community colleges, opened in 1966 to serve as the only institution of higher learning in Seminole County. During the academic year 1980-81, the college had an FTE enrollment of over 3,000 in the A.A. program. The college is a comprehensive one, offering programs in technology, vocational, adult high school, and continuing education. Head count in all these areas during 1980-81 was 21,000.

According to the U.S. Census, Seminole County, the third smallest county in land area in Florida, had a population of 83,692 in 1970, 16.8% of whom were black. However, with rapid urbanization, Seminole County has become one of the fastest growing counties in the nation. The Bureau of Economic and Business Research at the University of Florida estimates the population in 1973 at over 124,000, of whom 11.5% were black. Projections indicated that by 1980 the population of the county would be 134,600. Actual figures for 1980 show that over 180,000 people now reside in the county.

Seminole Community College...the only institution of higher learning in Seminole County...serves one of the fastest growing counties in the nation.

The college is located in the geographic center of an area undergoing a radical change in its basic character. Traditionally, Seminole County has been a rural, agricultural area. The recent population explosion in Central Florida, due primarily to the opening of Walt Disney World, has left low-income families, especially minority ones, in a cultural lag. Families who have for generations earned their livings from the land have been displaced. Farming has given way to the newer, more urban industrial-business community and its needs.

SURRY COMMUNITY COLLEGE is located in rural Piedmont, NC. Dobson, NC, is the county seat of Surry, a county of 50,000 residents. Significant area industries are textile and furniture manufacturing and tobacco farming.

Surry Community College... serves Surry County, North Carolina...where many students are first in a family to attend college.

The family background of Surry's students ranges from wealthy to poor. Family incomes place the average Surry Community College student in the lower middle class to upper lower class sectors of society. The vast majority of SCC students are the first in their families to go to college. Sixty percent (60%) of their fathers never finished high school, and half of those never finished grade school.

Surry Community College has a student population of over 1700 FTE in curriculum classes. Of these students, 42% are transfer, 39% are technical, and 19% are vocational.

Surry enrolls 5,000 students, including Continuing Education. The college enrolls more than 50% of the high school graduates in the county. This has been consistently the highest rate in North Carolina and one of the highest in the United States.

The student body is composed of 61% female and 39% male. Minorities make up only 7½% of Surry's students. Fifty-four percent (54%) of the students in curriculum courses are full-time, and 46% are part-time.

ADMINISTRATIVE SUPPORT

The COMPAS program evaluator found that the support and encouragement of the administration were important for a successful program. The support could come in various forms, but some type of commitment was needed.

The college administrative structure is typical of a deanship model. Departments elect their chairpersons, who serve two-year terms. The college and faculty have a collective bargaining agreement in which the chairperson is not considered an administrative position. The chairpersons report to three division Deans: they, in turn, report to the Dean of Instruction, who reports to the Executive Dean, which is the highest position on each of the four campuses. These Executive Deans also serve as system-wide vice-presidents reporting to the system President at the Central College Administrative office.

Most support was in the form of secretarial assistance, a liberal printing budget, and cooperation in scheduling.

Although the administration supported participation in the project, there was little direct financial support. Most support was in the form of secretarial assistance, a liberal printing budget, and cooperation in scheduling. Direct financial support for the project came from the outside funds. In the past, campus budgets have been extremely tight for any faculty development. The administration felt that the project might develop a mode for faculty interaction and improvement to be used later with other faculty.

Most faculty chose to devote their time to the project on an overload basis, instead of a released time basis. Since most usually taught an extra class, the project was able to replace the class.

Considered multidisciplinary, Harper's PATH program was administered by the Dean of Educational Services. Decisions regarding released time for program faculty were made by the Vice-President of Academic Affairs in consultation with the Deans of Educational Services and Instruction. Periodic formal and informal reports on the progress of the program were given to these administrators, as well as to the college President, the Associate Deans of Counseling, and the academic divisions. During the summer of 1980, prior to the start of the program, a mini-workshop on the purposes and methodology of PATH was held for all administrators.

The college provided... indirect support in the form of secretarial services, duplicating, mailing expenses, and purchase of some supplies was readily available.

The college provided no direct financial support for the program, but indirect support in the form of secretarial services, duplicating, mailing expenses, and purchase of some supplies was readily available. In addition, the college gave program faculty released time during the summer of 1980 so they could assist with student screening and recruiting. Additional released time was given in the fall of 1980 while the program was in progress.

A counselor was a vital part of the PATH staff. Besides teaching a course in the program, she served as academic and personal counselor for PATH students, and her assistance during the recruitment phase was invaluable. A mini-workshop concerning the purposes and methodology of the program was held for all Harper counselors during spring 1980. Because of this, the counselors were most helpful in identifying local high school seniors who they thought might benefit from the program. They also invited the PATH staff to attend local college nights and accompany them on recruitment visits to area high schools.

External funding for the DOORS program ended in 1978. Since that time, the program has continued with only minimal institutional support. The college has provided money to cover the cost of mailing and printing brochures. For the past two years, the director of the program has been given $100 to cover expenses incurred for informal gatherings of students and faculty. Materials needed for the classroom are purchased out of the teachers' department budgets. The college administration has provided a great deal of moral support and, on occasion, has subsidized travel requests by the DOORS faculty.

The college administration has provided a great deal of moral support and, on occasion, has subsidized travel requests by the DOORS faculty.

The original DOORS faculty received released time for the development of classroom materials and course content. Over the past few years, new teachers and courses have been added to the program. These instructors have developed their materials without the benefit of released time. Also, since the expiration of the original DOORS grant, the program director has not received any released time.

Direct support from counseling, which is vital to the success of the DOORS program, has been reduced since the first year of DOORS. Changes in counseling personnel and communication factors have contributed to this problem. To improve this situation, a concerted effort is underway. It is hoped that by the fall 1982 semester, a counselor will take an active role in the program and provide extensive assistance in the student recruitment.

At the time the STEPPE project was implemented, the administrative structure at Joliet consisted of the President of the college, the Vice-President for Instruction, the Dean of Arts and Sciences, and the department chairmen. The site director, who is also Chairman of the Physical Sciences Department, worked with the other department chairmen in scheduling courses and with the Dean in scheduling released time for project staff as well as project courses. Financial support from the college was very limited and consisted mostly of providing secretarial and clerical help as well as supplies.

Each teacher was given three hours released time to prepare materials and develop learning cycles.

Released time was given to the project faculty during the spring semester before the courses were offered. Each teacher was given three hours released time to prepare materials and develop learning cycles. The counseling department gave the project its full support and provided valuable assistance.

The college did provide secretarial assistance as well as a counselor for the program. And... courses set up for the RISE program in fall 1980 would run no matter what the enrollment.

After getting the staff for the RISE program and finding that a grant would be forthcoming, the program director at Prairie State contacted the Vice-President of Instructional Services to explain the COMPAS project, and asked to participate in it. Although the scope of the project was explained, it was not fully understood until the project director from Illinois Central College visited the campus. The program was approved as long as the grant supplied funds for the development of course materials. The college did provide secretarial assistance as well as a counselor for the program. An additional concession was made: courses set up for the RISE program in fall 1980 would run, no matter what the enrollment.

The Director of Student Services assigned a counselor to be responsible for the STARS program.

The administration at Seminole Community College was supportive of the STARS program. The site director received help from the division chairmen in scheduling the STARS courses and giving released time to the faculty. The Director of Academic Affairs volunteered to go through administrative channels to obtain local Board of Trustees approval. The Director of Student Services assigned a counselor to be responsible for the STARS program. This proved one of the most important reasons for our success.

In retrospect, the administrators initially supported the program because they had confidence in the faculty involved and not because they totally understood what the program was attempting to do.

During the first semester of the program, administrators were invited to a special luncheon, at which time the program was explained. After this luncheon, they supported the STARS program because they felt it was worthwhile.

The Site Director reported directly to the Academic Dean, who, while reporting to the President, could act independently on the CREATE program.

Additional released time of one three-quarter hour course was provided by the college.

The college supplied the program with an office, furniture, supplies, and phone. Additional released time of one three-quarter hour course was provided by the college. Total released time for the faculty in the CREATE program was one three-hour course in each of two quarters. Also supplied by the college was a part-time counselor. This counselor interviewed all students entering the program and set up their schedules.

PROGRAM DESIGN

The heart of any educational program is the selection and training of the faculty. Once they are selected and trained, the program can begin to take shape.

Initial interest in the possibility of a Piaget-based project began in the science department at South Campus with faculty members in physics and chemistry. When an open letter was sent to the rest of the faculty to find any others with similar interests, three responded in the affirmative. By the time the project was ready to begin, two faculty members bowed out of the project due to other commitments, and another agreed to join the project. Each staff member was interested in new teaching techniques and in the opportunity to interact with members of other departments. Prior to the program's beginning, there developed on South Campus, a classic stereotype in the relationship between the humanities and the sciences. The opportunity to cut across

disciplines and point out their commonality was an exciting opportunity. This program could serve as a vehicle for faculty development and revitalization. In addition, the interdisciplinary nature of the project could broaden the participating faculty's views of other areas of the college.

After attending the training workshop at Illinois Central College, the staff was receptive to the project concepts and the application of the learning cycle to the South Campus program. To foster communication among project staff, bimonthly meetings were scheduled. Target dates were also set up for the completion of project materials. At first, the staff concentrated on the characteristics of the typical students entering the courses. It was decided that they would be:

1. in no developmental courses,
2. able to take at least three of the four courses and be full-time,
3. first-semester college students, not transfer students or coming from the developmental classes.

Each staff member was interested in new teaching techniques and in the opportunity to interact with members of other departments.

These criteria later proved much too restrictive. The pool of students meeting these criteria is much smaller at South Campus than was originally believed. The developmental program involving English and math skills is quite extensive at South, which leads to two effects:

1. Freshman English and math are at quite a high level. For example, no college level (100 or above) math course has less than a two-year high school algebra prerequisite.
2. Most entering students take at least one developmental course in either math or English.

During the spring term, problems developed in bringing the staff together at a common time. This resulted in only one monthly meeting, which was possible, due to all college

meeting hours being left open one Friday per month. The staff generally completed course materials by July 15, so they were able to try out materials on each other during a summer workshop.

The Project Site Director arranged to coordinate class schedules with the two division deans, so each class was offered at non-conflicting times. He again explained the project to each dean. All staff members tried to describe the project to their individual departments by answering questions on goals and methods. In addition, at the all-college meeting the site director presented project methods and goals.

The faculty and the counselor for the PATH program were recruited in 1977 prior to the writing of the first COMPAS grant proposal. In recruiting staff, the director looked for faculty members who could work well with other faculty in a group, were open to new ideas, wanted to try new methods of teaching, and taught courses that satisfied the general education requirements for the A.A. and A.S. degrees.

Weekly seminars were held during spring and summer 1980 while faculty members were writing Learning Cycles for their courses.

Prior to their involvement in the program, only the director and one other faculty member had some formal exposure to Piaget's theories and the Learning Cycle. In the fall of 1979 staff training began in bi-weekly seminars. However, the COMPAS Workshop at Illinois Central College in December 1979, for faculty from all the community colleges in the project provided the inspiration and enthusiasm the Harper faculty needed to launch their ambitious program. Weekly seminars were held during spring and summer 1980 while faculty members were writing Learning Cycles for their courses. These continued during the fall while the program was in progress.

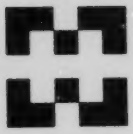
The spring and summer seminars provided a forum in which faculty could:

1. make decisions about the type of program they wanted,

2. decide upon student recruitment and selection procedures,

3. discuss the reasoning skills required in their respective disciplines and how they could be developed using Learning Cycles coordinated across the disciplines, and

4. try out their Learning Cycles on the rest of the staff and receive feedback.



The only problem in setting up these seminars was finding a time when all faculty could be present.

The following criteria was established for the selection of students for the PATH program:

1. They were to be entering college freshmen having high school diplomas or GED certificates, who were interested in entering the college's transfer programs but were undecided about what their academic major should be.

2. They were to be full-time students who would be able to take all the courses offered in the program.

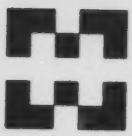
3. The students selected were to rank in the second or third quarters of their high school class and not need extensive remedial work in English or mathematics.

4. Only students who would be comfortable working in peer groups were to be considered.

5. It was also decided to take some older women who fit the above criteria, but who, due to family obligations, would not be able to take all the course offerings.

It was decided to make PATH a one-semester program offered during the fall semester. It would consist of six courses that would partially fulfill the general education requirements for the A.A. or A.S. degree, leading towards transfer to a four-year institution. Students would take all six courses unless there were compelling reasons for not doing so. Courses included English

Composition, Reading and Study Skills, Political Science, Physical Science, Mathematics for Liberal Arts Students, and Human Potential Seminar. The total semester hour load was 16. Later in the summer, sections of Elementary Algebra and Developmental English Composition were added to handle students having deficiencies in these areas.



Courses were scheduled so students would have Fridays free, which might encourage them not to work at outside jobs during the school week. Once scheduled, these courses were marked "temporarily closed" on the registration printout so only PATH students would be allowed to register for them. Because the Human Potential Seminar met at noon one day a week, the majority of PATH faculty could attend periodic student-faculty seminars planned by the counselor. Students in both sections of English met at the same time, but were graded according to different standards. The Reading instructor coordinated her teaching with the assignments in other courses. She also assisted the students in developing study, notetaking, and test-taking skills required in the other courses. In general, the program faculty attempted to coordinate their Learning Cycle so that they were all working on the same reasoning skill at approximately the same time. This coordination worked well for the first eight weeks. After that, there was less coordination because of the divergence of concepts being stressed in the different courses.

The general faculty were kept abreast of the program's progress through a mini-workshop held during faculty orientation week preceding the fall 1980 semester.

The DOORS program has been in operation since the spring of 1977. During this time, a total of 15 individuals -- 13 faculty and 2 counselors -- have been associated with the program. Only one of the original seven participants is still actively involved in teaching in the program. The original DOORS staff, as well as the new faculty, was recruited from volunteers. An individual's willingness to experiment with new materials and techniques is an important criterion used in faculty selection.

The more experienced program personnel offer their assistance to those who are new. When the program is offered in the fall, the teaching staff meets bi-weekly. Coordination of teaching efforts and student progress are the major items considered at these meetings. Meetings are held during the "off-semester" to revise materials and plan for the following year.

The more experienced program personnel offer their assistance to those who are new. When the program is offered in the fall, the teaching staff meets bi-weekly.

Responsibility for class scheduling, program publicity, and student recruitment and registration is usually left up to the Director. Decisions regarding course content and coordination between disciplines is the responsibility of the teaching faculty. Faculty input is always solicited before any major decisions or significant change is made.

The teaching staff for the STEPPE program was selected from teachers who participated in a two-day Piaget workshop held at Joliet Junior College and presented by the DOORS staff from Illinois Central. A number of the workshop participants were contacted, and those that expressed an interest in being involved in the STEPPE program were selected to teach one of the courses. All the STEPPE staff, with the exception of James Cooper, attended the workshop at Illinois Central College. During the spring 1980 semester, teachers in the program met weekly to establish criteria and methods for selecting students and to write learning cycles.

The staff established the following criteria for the selection of students and courses to be offered:

1. Only transfer students would be accepted into the program.

2. Each student was required to take three of the five courses, two of which had to be English 101 and Math 111.

JJC

During the spring 1980 semester, teachers in the program met weekly to establish criteria and methods for selecting students and to write learning cycles.

3. Each student had to qualify for English 101 by either taking a pre-test in English or having an ACT of at least 14.

4. Only transfer courses would be offered.

5. No course was selected that represented a prerequisite for another course.

Though it was not a criterion for selection, students who had not declared a major were given preference over those who had because those with a declared major would normally already know what courses they wanted.

The program would last only one semester since no sequential courses were offered. The courses offered in the program were:

English 101	(Rhetoric)
Geography 111	(Physical Geography)
Math 111	
Psychology 101	(General Psychology)
Sociology 270	(Marriage and the Family)

Communication with the rest of the faculty consisted of presentations by the Site Director at general faculty meetings when the program and its progress were described. There was no serious attempt to coordinate the courses within the program, although some coordination did occur here. Since the department chairmen at Joliet Junior College are responsible for scheduling courses, each chairman was contacted by the Site Director, and their complete cooperation made it relatively easy to devise a satisfactory course schedule. The allocation of students in each course was set at zero, and the authorization to raise the allocations was given only to the Site Director and the counselors. This made block scheduling easy.

The more experienced program personnel offer their assistance to those who are new. When the program is offered in the fall, the teaching staff meets bi-weekly.

Before the project started, a call went out to all faculty, explaining the scope of the project and asking for volunteers. The unexpected result: seven faculty members expressed an interest in the project. It was decided to include all seven faculty members since a large number of disciplines were represented: chemistry, English, history, mathematics, physical science, psychology, and sociology. It was also decided to include a counselor in the project, and this request was granted by Student Services. RISE was born.

Training for program personnel consisted of a three-day workshop for all COMPAS project participants held at Illinois Central College. This workshop introduced all the staff to Piaget's work and to the mechanics of putting a learning cycle together. Two of the RISE staff had already had a workshop or a Chautauqua short course on the learning cycle. After the workshop, program participants started writing learning cycles and planning the implementation of the program at Prairie State.

At the first meeting, the group decided to run a one-semester program starting in the fall of 1980 and, due to the large number of faculty in the program, to have two tracks for the students. Block scheduling, which would be adopted to develop a group feeling for students, would allow 40 students in the program. Since seven disciplines were represented, there would be two English sections, giving the students a choice of three other classes. Students would be part of the RISE program if they were enrolled in at least three of the classes, but it was hoped they would enroll in a core of four classes. There would be a maximum of 20 students per class because of extensive student interaction. Of all the courses in the program, four were considered the first course in a year sequence, English 101, Chemistry 110, History 111, and Physical Science 111, while Mathematics 112, Psychology 101, and Sociology 211 were non-sequence courses. The second semesters of English and Physical Science were offered during the spring 1981 semester after student requests to continue the learning cycle type of instruction.

Students in the program would be high risk, not remedial or developmental, but rather high school students who were average to above-average in ability but for some reason did not do well in high school. The target population was high school students who graduated in the lower half of their high school classes with ACT scores between 17 and 23. A second target population was similar to students already enrolled at Prairie State.

Monthly staff meetings were scheduled for the spring semester while material was being developed. Total staff participation was difficult due to varying schedules. The purposes of the staff meetings were to exchange learning cycles, disseminate general information, and foster crossover between disciplines. Information was exchanged more readily on an informal basis, which was also how the class schedule was set up. Faculty members were asked to submit times they would like their classes to meet. This request was sent to the program counselor, whose responsibility was to develop a class schedule. The program faculty then sent this schedule to the departments for approval and incorporation into the general class schedule. Classes were flagged so a student could enroll only through the program counselor or director. At the beginning of the fall semester, someone forgot to flag the computer program, and some mail-in registrations were placed into the RISE classes. Since this was an administrative problem, those students were removed by the head of student services.

Monthly staff meetings were scheduled for the spring semester while material was being developed.

To determine who would be interested in working in the program, a one-page questionnaire was sent to all faculty at Seminole Community College. From those responding positively, eight faculty members were chosen to assure a broad representation of the academic disciplines.

The two-day workshop at Illinois Central was the first formal exposure to Piaget's ideas for all but three of the instructors. This important workshop set the tone for the entire project. During the spring semester, the staff met every other week to plan the STARS program and develop learning cycles.

During the spring semester, the staff met every other week to plan the STARS program learning cycles.

The STARS program is geared for college-parallel students, both recent high school graduates with average or excellent grade point averages, and returning students who have not been in school for a number of years, especially the memorizers or unsure entering students.

During the first year, students signed up for at least three STARS courses in Term I (they could choose from English I, Career Exploration, Sociology, or Physical Science) and two STARS courses in Term II (English II, Fundamentals of Mathematics, Astronomy and Meteorology, or Economics). The courses were planned around common reasoning skills. For example, in Term I all the classes focused on, first, observation and identification of variables, then description of variables, and finally comparison and classification. Although this was difficult with only one semester of planning time, several learning cycles were coordinated. In addition, students detected coordination even though it was not planned. To attract students, courses were block-scheduled in the morning four days a week. All STARS students were encouraged to take Career Exploration and English I.

The lines of communication between the project and the general faculty were difficult to keep open. There were workshops and reports at general faculty meetings; however, most faculty did not pay close attention unless they had a vested interest. Faculty support was needed, so participants kept trying to explain the program to other faculty members.

During the spring of 1979, Karl Taylor and Dick Thompson presented a faculty workshop on Piaget's learning theories applied to higher education. This introduction sparked faculty interest, and three faculty members tentatively agreed to participate in the program.

Faculty selection was largely dictated by the courses that were to be taught in the program. In the sciences, the only courses at the college that would lend themselves to a Piagetian approach were Physics Survey and Chemistry Survey. With one or two exceptions per year, the only students who take these courses are elementary education majors. North Carolina four-year institutions require nearly every other major to have one year of laboratory science and at least one semester of calculus. This also limited the mathematics course to Mathematics Survey, which was taken by the prospective teachers. The Director taught the Physics and Chemistry Surveys. Fortunately, the one faculty member teaching Mathematics Survey was interested in the CREATE program. The only other course taken by all elementary education majors at Surry was English. The director received a positive response, for the first English instructor asked to participate in the program.

While learning cycles were being developed, there were weekly meetings to review each other's work.

All faculty in the project attended the COMPAS workshop in December 1979 at Illinois Central College.

To help faculty apply Piaget's theories, a consultant who was a practicing psychologist specializing in Piagetian theories presented a second workshop. His workshop was a more detailed, theoretical treatment of Piagetian theories than was presented in the COMPAS workshop. This in-depth look at Piaget's theories helped program participants apply the Learning Cycle to courses in CREATE.

With only three people teaching in the program, it was easy to find a time when everyone could meet. While learning cycles were being developed, there were weekly meetings to review each other's work. After the program started, meetings became more infrequent.

Although this limited the amount of co-ordination between classes, it was not a serious handicap.

As noted previously, the courses selected for the program dictated the students that would participate. All freshmen education majors were scheduled for CREATE Physical Science, Mathematics, and English.

Since Surry is on the quarter system, one quarter would not have been sufficient time to benefit the students. On the other hand, nothing but CREATE courses for two quarters would not have given the students enough exposure to the usual college classroom. Therefore, each student took three CREATE courses for two quarters.

The courses were ones normally offered once each year. No schedule changes needed to be made. Unfortunately, since these courses were offered only once each year, a number of students had either failed one course or not taken one the year before. A number of such students who were not taking all the courses had to be admitted to each section.

RECRUITMENT OF STUDENTS

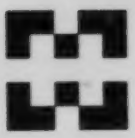
No matter how excellent a program the faculty develops, students make it possible. Some publicity produced to attract students can be found in the appendices.

The college generally does not do massive recruitment. The trend at that time was to rely on spot newspaper ads and the "Community Leader Newsletter" the college sends to each household in Southern Allegheny County. The project was showcased on the front page of the newsletter, which has a circulation of over 170,000. This resulted in about 30 requests for information. Each request was answered with a personal letter. Also the admissions office was apprised of the student profile for the project. Screening was to be handled by the college advisors who test and see all entering students. Here the project was the

The project was showcased on the front page of the newsletter.

weakest because these advisors did not understand or believe in the project sufficiently to sell it to entering students.

Publicity for the PATH program was prepared early in the 1980 spring semester by the director and staff and consisted of news releases for the college and local newspapers, handouts, and a brochure describing the program's purposes and course offerings. These were distributed widely on campus and to counselors from area high schools. Harper's recruitment director distributed brochures to prospective students at area high schools and during the college days sponsored by regional shopping centers. Program staff often accompanied him or college counselors on recruiting visits.



By the end of May, these attempts at recruitment had borne little fruit. So the program faculty reviewed applications submitted to the Admissions Office and looked for students fitting the program's criteria. These students were sent letters telling them they had been selected to apply for a special program being initiated by the college in the fall. The letter included a brochure and an invitation to attend an informational meeting about the program. Similar letters had been sent to GED students and those in Harper's women's program earlier in May. These letters and meetings were successful; the first 37 students who had their files completed and went through screening interviews successfully were accepted into the program. Ten students who were interested in the program had to be eventually turned away because of lack of space.

The letter included a brochure and an invitation to attend an informational meeting about the program.

Students were screened through personal interviews with at least two of the program faculty. This was followed by a staff review of student transcripts, and of answers given by students to questions posed during the interview. These questions focused on students' ability to work in groups and be comfortable in an activity-centered learning situation, motivation for improving their reasoning skills, expectations of the program, and commitment to continued schooling.

Students selected for the program were invited to attend a general freshman orientation day in late July. At this time they took the college placement exams, met all the program faculty, who presented a brief outline of the courses they would be teaching, and registered for their courses. During registration they received the results of their placement tests and were advised about which sections of math and English to take. Students needing or desiring courses not in the program registered for them at the same time.

Prospective DOORS students are screened by the program director, who is responsible for almost all the advising and registration of students. If the effort to involve the Counseling Department directly in the program is successful, the director will be relieved of these duties, and thus be able to direct more attention to the academic aspect of DOORS.

The DOORS program is publicized in a number of ways. A brief description of the program and the type of student it is designed for appears in the college catalog and the class schedules each semester. These catalogs are available to all students, and the class schedules are mailed to every household in the college district prior to registration. Brochures describing the program are placed on display racks throughout the college and distributed to the counseling department. A two-page admissions update article, which explains the program in greater detail and lists all times the classes are offered, is sent to all counselors, as well as to students who inquire about the program by telephone or by mail.

A brief description of the program and the type of student it is designed for appears in the college catalog and the class schedules each semester.

The STEPPE program at Joliet Junior College enjoyed a unique situation: Leonard Hodgman, who taught Physical Geography, was the college recruiting officer. He was responsible for visiting the area high schools and presenting the college program. At the district high

schools, he distributed information sheets describing the STEPPE program. The counselors also played a significant role in recruiting students because they were the first ones to see any applications with undeclared majors.

As soon as the counselors had 15 to 20 students expressing an interest in the STEPPE program, they scheduled a meeting on campus for student orientation and screening. Once the students were screened and all the qualified ones identified, counselors would register them as a group.

Student recruitment was one of the biggest problems. The program counselor distributed a brochure to counselors in the district high schools. During the spring semester all these schools were visited by the RISE program counselor, the project director, or both. The visitation included an explanation of what RISE was and which students it was designed for. Counselors identified the names of high school students who might benefit from the program. Finally questions were asked about the program, and suggestions were made about ways of reaching the target high school population.

The program counselor suggested a better method for recruitment: go to the summer orientations for new students, explain the RISE program, and recruit students.

High school counselors were able to provide a few leads on students for the program, but not in the desired numbers. The program counselor suggested a better method for recruitment: go to the summer orientations for new students, explain the RISE program, and recruit students. This was done, and students who expressed interest in the program were screened through their applications and high school transcripts. Unfortunately, in some cases the high schools did not submit transcripts to be evaluated. The Nelson-Denny reading scores were used as an additional screening item so students could be placed in appropriate English courses. A large number of students were screened during the two weeks before the fall semester, which resulted in the enrollment of 37 students for three or more courses in the RISE program. The students were told what the

program was about and what type of instruction they would be receiving before they signed up for the courses and the program. This was done in small groups and served as orientation to the program.

Every entering freshman at Seminole Community College must attend an orientation session before registering for classes. For fall students, this orientation is held in July and early August, and is conducted by the counseling staff. Entering students are introduced to the STARS program during orientation when they are given a program brochure and a five-minute verbal overview. If any students are interested in the program they are encouraged to talk to the STARS counselor after orientation. The brochure points out these advantages and selection procedures:

Entering students are introduced to the STARS program during orientation when they are given a program brochure and a five-minute verbal overview.

Advantages

a. *Enroll in courses that fit together and build toward a common goal.*

b. *Share several classes with some of the same students and get to know them personally.*

c. *Meet in informal classes that draw on your past experience to the fullest extent.*

d. *Learn the major concepts of several courses.*

e. *Explore many fields of study while starting your college work.*

STARS Selection Procedure

The STARS program is intended for a variety of students. You can be a recent high school graduate with an average or excellent grade point average, or a returning student who has not been in school for a number of years. The main criteria for choosing the STARS program are personal. If you answer "yes" to the following questions, STARS might benefit you.

1. *Do you find it difficult to learn the major concepts in a course?*
2. *When you study for a test, do you spend the majority of your time memorizing details?*
3. *Do you have difficulty organizing your thoughts when speaking or writing?*
4. *Do you enjoy talking to people informally and learning how they think?*
5. *Do you have a hard time understanding the relationships among various disciplines?*
6. *Would you like to use your past experience to help you better understand your current studies?*

During the first class of the fall 1980 term, all 27 STARS students and eight faculty were invited to a doughnut and coffee get-together. This allowed people to introduce themselves and immediately feel part of the program. Also any questions students had about the program were answered.

It was decided to place every freshman education major in the CREATE program.

As previously mentioned, program limitations dictated the type of student. Surry has only twenty or so declared freshman education majors per year. It was decided to place every freshman education major in the CREATE program. When the students made out their schedules with the counselor, they were put in all three CREATE classes and told they would be in an experimental program. In retrospect, this choice of words, and possibly this approach, was an error. A reverse "Hawthorne effect" was seen. Many students objected to being in an experiment and did not want to try anything "new." A pervasive attitude in the area served by Surry is: "It has worked for the last hundred years, so why change it?" Of course it has not always worked, but in some cases, this distrust of the

new tended to act against the program, since students were not allowed to participate.

On the first day of class, all CREATE students were given an orientation to the program. Program faculty discussed CREATE's purpose and underlying ideas.

MAINTAINING THE PROGRAM

Once a program is operating, the next question is whether or not it will continue. The momentum of traditional education is great, so unless special efforts are made to maintain enthusiasm, the program will immediately start to dissolve. At each of the colleges, there were various efforts to maintain the program.

No formal staff seminars were held, but there were informal gatherings to discuss the project.

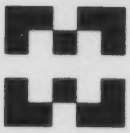
During the LIFT project at Allegheny there were visitations by the external evaluator and by members of DOORS staff, who visited the classes and talked with project members. No formal staff seminars were held, but there were informal gatherings to discuss the project.

Group testing was carried out during a regular scheduled class hour, since a special meeting for that purpose was not feasible.

During the program at Harper, no formal social activities were planned for the PATH students. However, the counselor used some get-acquainted activities during the first week of class, so students were soon very friendly with each other and began to go out together socially in off-school hours. The counselor also suggested that students call faculty by their first names, which led to better rapport between teacher and student.

Program faculty attempted to visit each other's classes, but, due to time conflicts this was not too successful. All faculty did attend the Human Potential Seminar at least

twice during the semester and took part in the activities with the students. Three members of the DOORS staff from Illinois Central College visited the program in late September, meeting with the students in two different classes, the staff individually and collectively, and administrators most directly involved with the program. The COMPAS project evaluator visited the program during the semester to interact with students and faculty. An invitation was also extended to all Harper faculty and administrators to visit the classes, but none chose to do so.



The faculty found these weekly seminars so helpful that they continued to meet weekly after the program concluded...

The program faculty continued to hold their weekly seminars during the course of the program. These were used to:

1. facilitate coordination of the courses,
2. revise learning cycles,
3. establish in-house evaluation procedures,
4. coordinate the evaluation by the COMPAS Project Evaluator,
5. discuss students' progress,
6. lay plans for the future of the PATH program.

The faculty found these weekly seminars so helpful that they continued to meet weekly after the program concluded to prepare for the following year's program. The only problem in setting up these seminars was finding time when all faculty could attend.

In addition to inviting general faculty and administrators to attend the weekly seminars and visit the PATH classes, the PATH staff held another mini-workshop following the conclusion of the program during spring Faculty Orientation Week.

In the middle of the spring semester, three mini-workshops were held to introduce faculty to the Learning Cycle, Piaget's theory, and the PATH program, with the hope of

attracting other faculty to join the program. These three workshops were poorly attended, but some interest was generated in those who did attend.

The program's in-house evaluation took on a myriad of forms, depending upon the individual instructor's preferences and the group's consensus. Some faculty gave their students the Harper Faculty Evaluation Form to fill out at the end of the semester. In general, the results are positive. In retrospect, the staff feels that all faculty should have used these forms in their classes. At midterm the faculty and students met for an informal evaluation of the program to that point. The feedback between students and faculty during this meeting was helpful to both groups.

The political science instructor used a standardized American government test as a pre- and post-test for her PATH students. The same test was given to a group of students in another section of the same course taught outside the program. No significant differences were noted. Students in the PATH English classes were asked to submit a writing sample to their instructor at the beginning and end of the semester. These were read and graded by three English instructors at Harper who did not teach in the program. These grades are now being analyzed.

An Academic Orientation Inventory was given to the students by the program counselor. The results of this inventory indicated how comfortable students were in an academic situation. The majority of the students did not score high, indicating their discomfort in such a setting. However, the females in the group did score higher than the males.

During the semester following the program's completion, the director and counselor studied the students' first semester GPAs, their high school rankings, ACT scores, and their grades in PATH courses. The results of this study are presented in the COMPAS project evaluation report.

In fall, 1981, a lengthy questionnaire was sent to those students who participated in the first PATH program. This will begin a longitudinal study of these students as they progress through their academic careers. In addition, their input into the program, after over a semester of regular Harper classes, should provide feedback to improve the program for future students.

After five years of operation at Illinois Central College, the DOORS staff -- both original and new -- remains a relatively close-knit group. Those who, for one reason or another, are no longer teaching in the program still remain interested in the progress of DOORS. The bonds created by the close associations necessary for the program's success continue. The "old" faculty are invited to attend the meetings of the present DOORS staff, and offer valuable assistance in helping keep the program in operation.

The success of DOORS has, however, been overshadowed by the fact that the program has not received the complete support of the faculty and administration. The majority are only vaguely aware of what is going on in DOORS. Fortunately, the program has not encountered any real, organized opposition. Failure to gain the complete confidence and support of the faculty and administration is the result of the manner in which the program was originally developed. The DOORS staff made a concerted effort to minimize these problems when working with the other colleges in the COMPAS project.

There is little doubt that the DOORS staff has had greater success in communicating the substance and intent of the program outside of Illinois Central College than it has had internally.

There is little doubt that the DOORS staff has had greater success in communicating the substance and intent of the program outside of Illinois Central College than it has had internally. Those connected with DOORS who have had an opportunity to work with COMPAS, make presentations at conferences, put on workshops, or visit faculty from other institutions, have always found the experience extremely gratifying and personally rewarding.

After the program started at Prairie State, a feedback session for all the students was planned, but this was very difficult because of the number of classes in the program and because of student schedules. Afternoon meetings were impossible since they would interfere with student work schedules. Therefore, after a month the feedback sessions were discontinued, and instead students expressed their opinions to the counselor and/or program director. An end-of-semester party was attended by a majority of students in the program. Sweat shirts to be worn by the staff and students in the program gave the students an identity which set them apart from the rest of the student body. They also served as publicity for the program within the college.

Sweat shirts to be worn by the staff and students in the program gave the students an identity which set them apart from the rest of the student body.

Faculty within the program were encouraged to visit other program classes during the semester, but once again, schedules of individual faculty members were not conducive to such visitations. Staff not in the program were also interested in visiting RISE classes and were generally encouraged to do so. However, this openness did not result in a large number of non-RISE faculty visiting any of the RISE courses.

RISE staff interactions consisted of monthly meetings on Saturday mornings for the first two months of the semester. Staff exchanged learning cycles and talked about problems with students, and the logistics of writing additional learning cycles. During this time, a major problem emerged in the mathematics course: the wide range of abilities in students' manipulative skills. This eventually led to the abandonment of learning cycles in that course.

The general faculty and administration were kept advised of the RISE program through staff development programs at the college. Information was presented to the entire staff during a two-day program at the beginning of the fall semester and a full day during the semester. Program staff explained what RISE was about and what they thought of it. The openness of the program created a good image although some staff members didn't understand what the program was attempting to do.

Not until the DOORS staff visited Prairie State did the administration really learn what was being done. All the in-house explanations resulted in the administration believing that RISE was a developmental program. After a half-hour with the DOORS staff, the mission of the program became clear. The DOORS staff also encouraged faculty members in the program. They offered suggestions for learning cycles and pointed out some innovative ideas faculty had incorporated into their classes.

The visitation by the outside evaluator also increased administrative awareness of the program and gave it credibility.

The visitation by the outside evaluator also increased administrative awareness of the program and gave it credibility. Moreover the staff felt free to express negative reactions to an outsider rather than expressing them in regular meetings. The staff could be prefectly honest and not worry about personality conflicts which might undermine the program. Since the outside evaluator was going to evaluate the entire project as well as individual sites, the program director did not conduct any formal evaluation of the RISE program. Informal evaluation did take place through individual student feedback, which made it easy to find out who was using learning cycles and whether or not the approach was successful.

Student evaluation consisted of a pre- and post-test of the entire program student body. Both tests were administered in the English class, in which all students were enrolled. An anxiety inventory was administered, along with a paper and pencil Piaget task test. The anxiety inventory was also administered to a control group of nursing students who were block scheduled. This was done to discover if block scheduling had affected instruction. There was also a one-half hour videotaped interview of a random sample of students in the program. This was done to attempt to correlate the paper and pencil post-test administered at the end of the semester. This was perhaps the most difficult experience for the program director, especially from the standpoint of trying not to show whether responses were correct or wrong when students explained how they solved the problems. In

addition, two of the program faculty administered a short student questionnaire about the courses they taught, the program, and the materials used. Student response was positive.

Program faculty carried out their own student evaluations for their courses for the purpose of assigning grades. There was constant emphasis on the search for process in the evaluation and constant stress on the unfairness of evaluating students on content rather than on process. There were no repercussions from the students that the evaluations were unfair in the courses, so it seems the process was being evaluated by the program staff.

Three program faculty abandoned the learning cycle approach to instruction during the last half of the semester:

1. chemistry, because students were continuing to the second course in a sequence under a different instructor and they needed content,
2. mathematics, because of wide divergence in the students' manipulative skills, and
3. history, because the instructor thought it was about time the students learned something.

For the faculty, one of the best features of the STARS program was the chance to work closely with faculty in other disciplines.

One important outcome of the project was that faculty tried something new. This has resulted in the incorporation of new materials and new teaching techniques in some courses.

For the faculty, one of the best features of the STARS program was the chance to work closely with faculty in other disciplines. Re-evaluating and making major changes in a course is time-consuming, and under typical classroom pressure, it is extremely hard to do. The project provided time to do this. A regular line of communication was established among all

the faculty in the project, and it was educational to compare teaching objectives in the various disciplines. Many STARS faculty members learned that the necessary problem-solving techniques and the major difficulties of students were the same in all disciplines. For faculty communication and respect, this project was invaluable.

The STARS faculty met every other week during the project. During these seminars, they shared class experiences, critiqued each other's learning cycles, and listened to and questioned visitors. Visits by the DOORS staff and the program evaluator were particularly helpful in giving direction and support. During one visit by the DOORS staff, a half-day workshop was held. All Seminole Community College faculty were invited. Twelve new faculty members came; four more had time conflicts but requested the workshop material. Thus, over one-third of the full-time academic faculty at SCC either participated in or became involved in the project workshop.

Visits by the DOORS staff and the program evaluator were particularly helpful in giving direction and support.

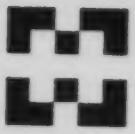
The program counselor is doing a follow-up study on the original 27 STARS students, 22 of whom were still in school one year later. Students also evaluated the program favorably, and that, added to the high retention rate, makes the staff optimistic about the program.

During the first two weeks of class at Surry, a cook-out was held at the director's home. All CREATE program faculty attended, but only two students, so the get-together was seen as a failure. After later conversations with the students, it became apparent that as freshmen they did not know each other and were quite uncomfortable. Had it been held at the college during the week or been later in the year, a much larger response would have been assured. Since the main purpose in having the cook-out was to foster student interaction early in the term, the former approach is clearly preferable.

During two quarters of operation, faculty members met about every other week to discuss their classes.

During two quarters of operation, faculty members met about every other week to discuss their classes. Although all faculty attended these informal lunch meetings, they usually discussed problems of individual students at other times.

The DOORS staff visited the program, as did evaluator Mel Hall and several graduate education students from nearby universities. Aside from benefiting the visitors, their stays on campus gave the CREATE staff an excellent opportunity for self-evaluation, as well as giving fresh views on the program.



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EVALUATOR'S REPORT

EVALUATION

The COMPAS project was fortunate to have the services of a professional evaluator, Dr. Melvin Hall of Sangamon State University, Springfield, IL. He spent over two years observing the project, collecting and analyzing data, and writing his evaluation. This chapter will highlight the findings of his 300-page report. More details can be obtained from Dr. Thomas Campbell, Illinois Central College, East Peoria, IL. The following is adapted from Dr. Hall's evaluation.

PROJECT DESIGN

The COMPAS staff proposed seven questions as guides in developing an evaluation design. These questions provided the initial focus of the evaluation.

1. Do student reasoning skills improve during project participation?
2. Do students become better oriented to college work?
3. Do students learn social coping skills?
4. Do students become more self-directed learners?
5. Do students complete coursework more often or have better attendance?
6. Do students recognize skill emphasis in other courses?
7. Do students perceive the relationship between disciplines differently?

In addition to these short-term questions, the evaluation was structured around three long-term considerations:

1. Do project effects seem to generalize to other classes?
2. Are project students more likely to complete long-term goals?
3. How does the performance of project students in later semesters compare with performance during the project?

While the early stages of design and implementation focused on these areas, site visits and initial data collection suggested modifications of these broad questions. Each question remained of interest, but additional precision was eventually possible in outlining the agenda for evaluation data collection. The first question, Do students' reasoning skills improve during project participation? was later made more specific. The focus of learning cycles is on the transition between the third and fourth stages of cognitive development, i.e., transition from concrete operational to formal operational thought. Therefore, evaluation of reasoning skill development centered on the underlying structures presumed to characterize this transitional period: hypothetical-deductive reasoning, inductive-scientific reasoning, and reflective abstraction were examined.

The second question, students' orientation to college work, was finally expanded to include clarification of vocational and educational goals, and personal talents and abilities.

While the Learning Cycle approach was the primary method offered by COMPAS, the fact that COMPAS students attended several classes as a group was also thought to influence the project's impact. Questions relating to social coping skills, attrition, and attendance began to focus on the presumed effects of block scheduling. This evaluative thrust included questions such as:

a. How does block scheduling alter the social experience of students?

b. Can this be thought to enhance the social communication referred to in the Piagetian model?

c. Does the familiarity promoted by block scheduling reduce student anxiety and alienation?

DATA COLLECTION TECHNIQUES

Multiple data collection techniques were used. The evaluation proceeded iteratively, with initial data collection leading to modification of the overall design. In keeping with this iterative approach, early data analysis was followed by attempts to confirm or disconfirm findings. The investigation moved back and forth between participants and evaluation specialists, the intent being to draw project participants into the evaluation, thus making the results more credible, persuasive and valid.

1. Interviews

Interviews were the primary method of data collection. In addition to Dr. Hall's initial visit in spring, 1980, he also made at least one extended visit to each campus near the completion of the program. Interviews were unstructured, though focused on the broad issues already described.

Each project director, in consultation with the project evaluator, scheduled these interviews. The evaluation interviews included:

a. All COMPAS faculty and affiliated staff

b. Key college officials

c. Students selected for videotaping on Piagetian tasks

d. As many COMPAS students as feasible, in several small groups or individual interviews.

2. Observations

Because process was so important in the COMPAS evaluation, direct observation proved a crucial element. Since the observations were intended to promote understanding of what went on during a learning cycle, they were scheduled conveniently and purposefully, rather than randomly.

3. Cognitive Development Testing

The COMPAS project presented an ideal opportunity to validate a paper-and-pencil measure of cognitive development, so pre- and post-testing was included in the evaluation design. All COMPAS students were pretested on a paper and pencil test which combines a revised version of Hans Furth's Inventory of Piaget's Development Tasks and several problems developed by Dr. Thomas Campbell and Dr. Tomlinson-Keasey. In addition, on each campus a randomly selected group of four to six students was tested by using a variation of Piaget's Methode Clinique.

Correlations between the written and performance test results served as a validity test of the written test. To combat the problem of carry-over between instruments, the paper and pencil test was administered to all students during the first two weeks of the COMPAS project. The structured interview using Piaget's tasks was administered on an individual basis two weeks later. Correlations between individual items, the entire scales, and patterns of between-school variation were examined.

Project staff members were briefed in structured interview techniques by use of a film of Karplus et al., and videotapes of Dr. Thomas Campbell conducting a simulated structured interview. Local staff designated someone to conduct the local interview, so the person was not always part of the COMPAS project.

4. Anxiety

As a measure of the impact of the project on school climate, student alienation, and retention/attrition, the Spealburger State-Trait Anxiety Inventory was used. This self-evaluation questionnaire provided a good, quick measure of student anxiety in both its generalized form (trait anxiety) and in the specific classroom situation (state anxiety).

This instrument was administered to the English sections of each COMPAS project, another "regular" English section, and, when possible, a special English section designated for other block-scheduled students, i.e., the English section that all teacher preparation students took, or that all nursing majors took.

This three-way administration was to be pre and post, with students taking the instrument on the first day of class and one week before the final exam. This simple instrument consists of 40 multiple-response statements (20 for each state and trait). Combined, the scales took 10-15 minutes to complete.

It was hypothesized that when compared to regularly scheduled students, both types of block-scheduled students would show reduced anxiety at the end of the semester on state anxiety while all three groups would begin relatively even on both state and trait anxiety.

REVIEW OF QUALITATIVE DATA

This section presents an overall picture of the COMPAS project. This composite sketch reviews qualitative and descriptive data collected during the evaluation. In this review, data are integrated to portray the COMPAS experience accurately, succinctly, and fully.

ISSUE #1: Do student reasoning skills improve during project participation?

This issue statement deals with the primary purpose of COMPAS. The demonstrated potential of the learning cycle approach for facilitating student progress from concrete operational to formal operational thought is central to the project's success. In the COMPAS scheme, the success of this transition should be revealed through an assessment of student skills in hypothetical-deductive reasoning, inductive-scientific reasoning, and reflective abstraction. Comments and observations have suggested several areas of project success and/or failure in meeting this overall project goal.

MEASURABLE IMPROVEMENT

Logically, to investigate project success in facilitating cognitive development, areas of measurable improvement must be examined. Such assessment of COMPAS students is the basis of the next section of this report. However, additional qualitative dimensions to the question of measurable improvement are explored below.

1. Variance in Assessment

Based upon the COMPAS experience, it is clear that the project's impacts were not uniform either across project sites or within a single program. In fact, there was as much variance in faculty assessment of cognitive development within some individual teams as there was across all project sites. This variance presumably resulted from gaps in understanding specifically what reflected movement from one stage of cognitive development to another, real differences in the impact of the project, and effects of varying levels of student immersion in the project. Thus, quantitative estimates of changes in cognitive development must be interpreted in light of the fact that they inevitably suppress these fluctuations in impact, and report average figures.

2. Immersion as a Factor in Determining Measurable Improvement

Variance in project impact is further affected by the number of project courses offered on each campus and the number of these courses students normally took as a part of the project.

Course offerings often determined the level of student immersion. For example, students enrolled at Surry had only three courses per term to choose from. Project staff, however, offered winter sequels to fall semester offerings, and, as a result, some students took as many as six project classes. Immersion is sharply different at other sites where many more courses were offered but where students were expected to earn fewer credits in project courses. At Prairie, for example, seven courses were offered in the same term, but students were expected to enroll in only three.

The two-term sequence of courses could affect immersion in another way. Given the project's focus on development of reasoning skills, it was assumed that involving transitional students in cognitive development activities in five or six concurrent classes is qualitatively different from having the same number of contact hours spread over two terms of sustained contact (three courses each).

Since several factors must be weighed in assessing immersion, students assisted by responding to questions about their identification with the project and its faculty. In addition, the number of courses, the extent to which project students share an experience which is discernibly different, and the degree of isolation felt by these students suggest a level of immersion in the project experience.

Based on these factors, three fairly distinct levels of immersion were observed in the six new cognitive-based programs. Two projects, Seminole and Harper, would be described as having high immersion; three, Prairie, Joliet, and Surry, would best be described as moderate immersion; and recruitment failures resulted in Allegheny offering a low immersion experience.

High-immersion schools were characterized by:

1. Classes predominantly or exclusively made up of project students,

2. One or more courses which could be clearly identified as project courses,

3. A recruitment or admissions activity which suggested special status for program participants,

4. Some semblance of group identity noted by students,

5. A relatively high level of student awareness of project organization and objectives.

In these high immersion programs at Harper and Seminole, there was also a higher degree of cross-discipline coordination in topics presented, a clearly identified relationship among the faculty, and a single point of reference in scheduling or discussing project courses. For example, at Harper all PATH faculty and students met at mid-term to evaluate the project to that point, and throughout the term, both the career exploration and study skills classes served as core organizers of the project experience. In these settings, students saw the faculty collectively and thus had vivid images of project unity. At Seminole, a similar unity was promoted through the career exploration class and was reinforced through scheduled free time and in-class references to other project classes.

The presumed impact of this higher immersion experience was increased salience or coherence to the COMPAS effort. These project students, more than others, presumably knew that they were involved in something different, and they also better understood the nature of those differences.

Moderate immersion schools, Prairie, Joliet, and Surry, tended to have less homogeneity, but still shared several characteristics. Each had planned a common meeting time or shared non-classroom experience. Surry attempted a social event which did not prove successful; Prairie was unsuccessful in identifying a common free time because of varying student schedules, and Joliet had a common time scheduled but failed to use it except to pretest project students.

Although these abortive plans were not major problems, they reflected circumstances which repeatedly reduced the coherence of these three projects. Each project responded to these initial failures and generally developed some group identification though perhaps not at the initially desired level. Prairie State perhaps came closest with its project sweat shirts.

The distinction between moderate and high immersion programs was largely one of quantity of common experiences rather than quality. This assessment is true of the low immersion situation as well, since it primarily resulted from recruitment problems. At Allegheny, the project's recruitment difficulty led to the establishment of several independent projects, each working with its own student population. In math, the students were uniformly low in ability; in physical science, there was a very small group of such students, and in English and psychology, there were large but distinct classes of students who were otherwise suited for the project. With one or two exceptions, the project experience of these students was limited to one class. Further, because the English and psychology classes contained significant numbers of students who didn't know they would be involved in a novel approach to classroom instruction, the instructors had to compromise their course expectations.

The usefulness of these immersion estimates is limited to a very general level of project assessment. They are quite appropriate as a backdrop for reviewing other project data but cannot in themselves be considered absolute. For example, classroom levels of intensity cannot be assumed to be consistent for a particular school, and some efforts at moderate or low immersion sites surpassed similar efforts at higher immersion ones. Overall, however, these estimates reflect the assessments of general student immersion in each project as gleaned from student and faculty comments. Specific immersion figures for each student, based upon a combination of the number of project courses, the degree to which instructors used the learning approach during the term, and an overall project immersion factor, would be necessary for such an immersion estimate to have any additional usefulness.

3. Side Effects

Another key factor in interpreting quantitative estimates of reasoning skill improvement is the impact of side effects. In addition to cognitive development, several features have been noted as key thrusts

of the COMPAS project. The relative importance of these program thrusts varied from one site to another. Often other thrusts like block scheduling or faculty development seemed to determine project impact more than the emphasis on cognitive development. It is not clear precisely what impact these other thrusts might have had on cognitive development, but two components are certain:

(1) The other thrusts influenced the amount of attention given to matters affecting cognitive development, and

(2) The perceived strength of these other impacts resulted at least partially from their being easier to observe.

4. Time Schedule

An area of uncertain impact is the length of the projects and the appropriateness of this as a measurement schedule. Furthermore, on each campus the length of terms varied, as did the number of terms during which the project was implemented. For example, the projects' school terms included quarters, semesters, and trimesters.

5. Ability Level Interaction

Yet another factor to consider in reviewing quantitative measurements of cognitive development is the potential interaction effects of ability level. Project faculty generally agreed that, below certain ability levels, the learning cycle approach, like any other instructional strategy, is severely affected by deficits in students' learning backgrounds. Further, since students' ability levels were tied largely to the success of recruitment efforts, and unsuccessful recruitment drives resulted in more marginal students being admitted, there may have been a subtle effect on the impact of each project.

6. Improved Performance

As a second major way of gathering opinions on COMPAS success in fostering students' cognitive development, faculty were polled on changes which they noted in student performance. In addition, they were asked if they had observed any indications linking improved performance with students' cognitive level. Thus, a factor in considering improvements in cognitive functioning is the extent to which project outcomes were student-oriented rather than logistically-oriented or aimed at faculty considerations. Changes in performance were often related to side effects of COMPAS rather than to changes in cognitive functioning. One clear exception, however, was in the area of writing skills.

There was some difficulty in monitoring these notions of improved performance in that student performance has typically been equated with end-of-term grades. For COMPAS this created several problems, two of which were the conditions under which these assessments were made, and the extent to which the assessment format affected perception of performance.

7. Conditions Surrounding Assessments of Performance

One notable impact of the COMPAS projects was their potential for altering the conditions under which learning took place and assessments of student performance were made. Project faculty said, "The learning cycle style sets up the conditions for students to join in and open up. If handled well, the teacher becomes a facilitator, and a more intimate environment develops." Specifically, the environment changes in the format for evaluating student performance because traditional multiple-choice test items fit poorly into the learning cycle approach. Also the fact that instructors ask students more about their reasoning processes during instruction and assessment promoted a real change in the conditions under which student performance is assessed.

ISSUE #2: Do students become better oriented to college work?

COMPAS participants had both positive and negative assessments of the project's success in orienting students to college work. On the positive side, the learning cycle approach fostered more interaction in the classroom. Further, this approach tended to promote more intimate contact with students while more aggressively engaging them in classroom activities. One student, for example, specified that the most important aspect of the program was classroom discussion, especially when it focused on experiments showing practical applications of esoteric knowledge.

These positive impacts were somewhat mediated, however, by unsuccessful recruitment and wide ranges in student ability levels. There was also significant concern that block scheduling helped to create an unreal experience for students. Other comments indicated that there was some frustration about the classroom approach. For example, one student reported, "We did a lot of unusual things; sometimes I think we took the long way of doing something." Another student indicated that, given a choice, she "would take at least a few of this type of class, but not all (classes should be like this) because some people might not like the way it is -- and want to just come in and get their work done. Some people don't like discussion."

1. Course Difficulty

Another consistent student reaction to COMPAS programs has been to raise the issue of course difficulty levels. Generally, project courses being too easy was only suggested as a possibility, and thus these comments can be distinguished from those which report that the approach made good performance easier. One student thought the project classes "were going to be hard because they were different; but they weren't. They were easy." Another complimented the program for addressing the needs of "people who are afraid or don't know that many people," but simultaneously suggested that the program was "a little too easy -- but pretty nice the way it is." A third comment mentioned the positive program characteristic of grouping students who had the same problems (about six people in their immediate group), but then hinted that it "might really be too easy." One student suggested that their load be set at 15 hours instead of 12.

Faculty noted that both extremes of comments had been received during the projects, with some students complaining about the workload, especially the volume of homework. Some students hypothesized that the instructors were compensating for the classes being easy by assigning extra homework.

Several factors remain unclear regarding course difficulty levels. For example, was there more work but easy assignments because of the difficulty level of the material? Did the course work seem easy because there was less memorization? Did the reduction in content pressure create an image of easiness? Each question seemed a plausible contributor to student perceptions of easier classes in COMPAS.

2. Experiential Component

By contrasting project and non-project courses, a CREATE student highlighted the value of yet another COMPAS feature -- its experiential component.

> "I've talked to other people from the other English classes -- I learned more about writing papers than they have, 'cause of the way it was taught, 'cause when you do experience something, you learn it better than just somebody telling you. History is just taking notes. I really don't learn; it's just memorizing for the exam and then forgetting it ... and here I've learned."

Student comments also support the generalizability of project-acquired skills and the project's motivating potential.

> "(Skills) will generalize to other classes, more like an independent study. It's hard, but it's fun too. Project classes are more like experiments, and you have to think on your own more."

"Sometimes it gets to be frustrating because the teachers won't tell you how to do something. You have to figure it out on your own. But it's helped me some. I try harder -- look through the book for answers -- don't depend as much on teachers."

3. Impact on Students

It had been anticipated that students would view the project as a new teaching technique to make the learning process more meaningful, but they would also experience problems in one or two of the courses because they felt they weren't learning what they had expected. When beginning an exploration activity, students would often remark, "This is silly," although just as frequently they later seemed to see the point of what they were doing and decide that it was not quite as silly as it looked. "There were more negative comments early in semester. As time went on, they seemed to develop trust in you, as if maybe you do know what you're doing." Non-project students also indicated that they appreciated the learning cycle approach.

ISSUE #3: Do students learn social coping skills?

The Piagetian-based learning cycle approach was the primary treatment offered by COMPAS, but block scheduling emerged as a salient aspect of the project's impact. One presumed cause of this impact was the mutual support provided by students who found themselves spending many hours together every week.

GROUP IDENTITY

As a corollary to the positive impacts of meeting people and finding support, COMPAS projects also promoted a sense of group identity. This identity made many students feel a part of the project but, more importantly, a part of their campus communities. One student indicated that non-project students were missing an important part of what the college had to offer.

Overall, the impact of the project on social coping skills seemed much less than the salience of block scheduling might suggest. In fact, the salience of block scheduling may have been more a reaction to a feeling of special treatment and novelty rather than a change in social coping skills. Students who said they were anxious about college continued to indicate this anxiety as the fall term ended. Others reported enjoyment of the camaraderie but seemed to make no connection between it and their performance. In short, students tended to see block scheduling as a convenience, a novelty, and a structural feature more than as an alternative socialization vehicle. Any impacts on social coping skills were more likely a result of maturity or increased sophistication rather than a direct outgrowth of block scheduling.

ISSUE #4: Do students become more self-directed learners?

The key element in COMPAS' impact on learners seemed to have been stimulation. The course format, classroom activities, and project support were all designed to stimulate marginal students and make them more active learners. The focus on experiential tasks and group work validated both approaches and revealed other thinking patterns to students as they cooperated in small groups. Some said that this stimulation made it easier to pay attention and be more personally involved. Students reported suddenly feeling responsible and being forced to think more on their own. "They give you a problem, but rather than tell you what you are to look for, you have to find it on your own. That way when you look at other problems, you figure out what they're looking for, and you understand it better."

Students agreed that close contact and high level of involvement resulting from group classroom work were helpful, and they unanimously felt that this group work was more important than the block scheduling. Group work was also credited with helping students see other problem-solving strategies and thinking patterns. They further suggested that it was easier to remember things when they had been discussed in the group. Within the group there was also a good possibility that when one student was in error, someone else had the correct answer.

EXPLORATION

In much the same vein, another student's comment on the project provided a glimpse of student reactions to exploration activities.

> "I like it. I'm learning more now than if I just went to class every day. These are easier...We do little activities and stuff, and we get to be involved rather than just sitting down and listening to a two-hour lecture. It's a whole lot better. Just when I think it's Mickey Mouse, Scott comes up with something which blows my mind."
>
> "(The program) helped me think more on my own... the material's hard, and it's just that we never know if we're doing right or wrong...it's like we have to figure it out for ourselves, which is disgusting! We've learned how to think more rather than just getting the teacher to tell us. I would take another class like this one; it helped me."

Not all students, however, indicated the same level of tolerance for, or interest in, this experiential-based approach. In fact, some labeled the exploration activities silly. But overall the projects received high marks from students as valuable sources of stimulation in helping them become more self-directed learners.

ISSUE #5: Do students complete coursework more often or have better attendance?

One indication of student satisfaction is their retention in the program. Several programs reported higher than average retention rates for the classes involved. Projects which offered courses over two terms were also able to review enrollments in second-term courses and arrive at other retention figures that reflected students indicating a willingness to spend more time in project classes. This latter figure must, however, be interpreted carefully since the decision of many students about second term enrollment was not related simply to satisfaction with the project, but also included the availability of needed coursework. Often the type or level of course needed simply was not available through the COMPAS program.

Lower attrition from project courses was coupled with another generally positive trend: more consistent attendance. While formal records were not routinely kept, faculty noted an obvious increase in attendance as well as a new level of community among students. In several project sections, students were able to explain the absence of their colleagues or indicate when someone would simply be tardy. This level of familiarity worked both positively and negatively, for a faculty member could not determine the validity of a student's absence simply because half of the students present provided the same explanation.

Despite higher attendance rates and lower attrition, most students who indicated initial anxiety or apprehension about college retained those feelings after program participation. However, the number reporting such anxiety was routinely low at all project schools.

ISSUE #6: Do students recognize skill emphasis in other courses?

Obviously, in those projects where logistical problems resulted in little overlap between classes, students could not be expected to have much recognition of the skill emphasis of other courses. The learning cycles' emphasis on cognitive reasoning undoubtedly raises awareness levels somewhat, but a coordinated, multi-disciplinary approach seems necessary for students to be aware of cross-course skill emphasis.

The COMPAS experience suggests that a key factor in heightening student awareness is the two-stage process of raising the question of skill emphasis with students and then providing coordinated, multi-disciplinary examples to illustrate common thrusts. Harper, Seminole, Prairie, and Surry students all volunteered examples in which the commonality of some skill or example was obvious. Joliet students were not interviewed.

ISSUE #7: Do students perceive the relaticnship between disciplines differently?

The COMPAS emphasis on a single cognitive approach, and efforts to foster a common group experience tended to decrease the students' focus on disciplinary boundaries. But this impact was neither obvious nor routinely noted on each campus. Where more coordination was accomplished, as at Harper, Seminole, and Surry, it was expected that more attention would be given to this project dimension though no solid evidence supported this contention.

SUMMARY OF QUALITATIVE DATA

Of the many factors monitored during evaluation, the one which seemed to summarize the rest was immersion. The degree to which a student

-- felt a part of something different,

-- was consistently exposed to learning cycles,

-- was involved in a variety of project classes which had high percentages of project students, and

-- became involved in project activities

seemed to dictate project performance on all preset criteria for project success. The type of student identified in project recruitment profiles, the type of faculty involved, the classroom atmosphere, reliance on Piaget's theory, and the project's focus on cognitive development all served as independent variables in an apparent causal chain where various measures of immersion became the dependent outcome. As outcome, immersion was described as factors in determining students'

-- reasoning skill improvement,

-- orientation to college work,

-- social coping skill development,

-- level of self-direction as a learner,

-- rate of retention and attendance,

-- level of recognition of skill emphasis in classes, and

-- perception of the relationship between disciplines.

Ultimately, project impacts would have to be determined by analyzing the varied indices of immersion for each student along with outcome measures to determine relative importance of those independent project thrusts.

REVIEW OF QUANTITATIVE RESULTS

The cognitive scale was designed to assess the performance level of college students on a series of tasks selected to represent mental functioning from concrete operational through a transitional period and into formal operational. Each stage is associated with a set of mental capabilities and a level of knowledge about the world which results in a set of logical operations different from those in the preceding stage.

For example, children in the preoperational stage, roughly three to five years of age, are unable to understand that an amount of water poured from a short, wide glass into a tall, thin glass is still the same amount of water. The increase in height of the water leads them to conclude that the tall glass contains more water. Piaget refers to this focusing on only one aspect of a stimulus array, in this case the height of the glass, as centration. The child who realizes that although both the height and the width of the glass change, the amount of water remains the same, uses conservation reasoning. Conservation merely means the child is able to understand that altering an object on one dimension does not change it in every dimension. Children in this stage still rely on the presence of a concrete object on which to perform the transformation operations but have moved beyond the preoperational child in their understanding of quantitative relationships.

According to Piaget, a person on the formal operational level is able to use abstract hypotheses rather than rely on hard facts or objects. Thus, the formal operational individual is able to operate at a purely symbolic level. In addition to this change in the ability to function abstractly, the level of logical formality also changes to include both deductive and inductive reasoning. This is the level at which Piaget's theory predicts most college students should be functioning.

Students of the age of those in this study would be assumed to have attained the highest level of logical knowledge, the stage of formal operations. Previous research has indicated, however, that college students frequently do not evidence an understanding of formal operations (Elkind, 1961; Towler & Wheatly, 1971), and for that reason a series of items designed to measure concrete operations were included in the scale.

The scale was constructed by selecting items from An Inventory of Piaget's Developmental Tasks (Furth, 1970) and a measure of cognitive development developed by Tomlinson-Keasey and Campbell (1974). All the items were drawings of common Piagetian tasks with four choice alternative drawings pictured below.

Four item sets were selected which measured conservation of quantity, conservation of weight and conservation of perspective, all tasks which are successfully completed during the concrete operational stage. Two additional sets of four items designed to measure conservation of volume, ability to make inferences, as well as a measure of propositional logic and a measure of inductive reasoning were combined to measure formal operations.

THE PARTICIPANTS

The size of the participant pool varied for each of the two measures. The anxiety measure was administered to 235 program participants as well as 200 control subjects. The cognitive measure was administered to the 235 program participants, of whom only 155 completed the post-test, and because the major results relate to these subjects, the demographic data for this group is presented in Table 1.

TABLE 1

Number, Sex and Mean Age by School

School	Sex of Subjects* Males	Females	Mean Age in Years
Illinois Central College	15	9	20.5
William Rainey Harper	18	14	18.0
Prairie State	15	9	22.1
Joliet	5	4	18.8
Surry	1	13	20.7
Allegheny	13	15	25.1
Seminole	12	12	19.0
TOTAL SAMPLE	78	76	20.5

*Three cases had missing values.

ASSESSMENT OF THE COGNITIVE MEASURE

1. Reliability and Item Analysis

Table 2 shows the standardized alpha reliability for the total cognitive measure and the various subscales at both the pre-test and post-test administration. The reliability for the scale as a whole was high at both administrations and was consistent across administrations.

TABLE 2

Standardized Alpha Reliability Coefficients
for the Cognitive Measures
Pre-Test and Post-Test

Scale	No. of Items	Pre-Test	Post-Test
Concrete Operations	12	.75	.76
Conservation of quantity	4	.24	.25
Conservation of weight	4	.80	.77
Conservation of perspective	4	.65	.63
Formal Operations*	8	.58	.72
Conservation of volume	4	.72	.67
Inferences	4	.39	.74
Cognitive Measure	20	.79	.82

**Because of the nature of the questions testing propositional operations and inductive reasoning, reliability coefficients could not be computed.*

An inter-item correlation revealed a substantial independence of the 23 items. These correlations ranged from -.05 to .62 with a median of .13 on the pre-test administration and from -.09 to .54 with a median of .14 on the post-test. This suggests that each item measured a relatively unique component of the variance.

The items are correlated highly with the subscale in which they are contained; that is, concrete items correlated highly with the concrete scale, and formal items correlated more highly with the formal scale score. Conservations of volume and inferences, items which were included because they indicate change from concrete to formal operations, correlated equally with the concrete and the formal operational scale scores.

2. Factor Analysis

To determine the underlying structural relationship between the items, a factor analytic procedure was applied to the items. A commonly accepted method for indicating that items measure similar aspects of performance is to examine the relationship between the items in terms of their factor loadings. Items which have high loadings on the same scale are taken as measuring some aspect of the same underlying psychological dimension. The data were subjected to an alpha factor analysis with an oblique rotational system. The factor structure was also determined for the measure on both the pre-test and post-test administration, and the results led to the same conclusions. Eight distinct factors emerged which were easily interpretable in terms of the measurement instrument's objectives.

Interpretation of the factors which resulted from this analysis was based on loadings higher than .30. Comrey (1973) has suggested that these loadings are the lowest value which should be interpreted, and the higher the loading, the more confidence one can place in the interpretation. The factors were identified, and the results point to the validity of the scale, at least insofar as the items which should conceptually form factors do so with reliability.

3. Cognitive Results

The large amount of data in the study made the presentation of a consolidated results section very difficult. Comparisons were made between schools and across schools, as well as by age and sex. The changes observed in individuals will be reviewed, and the conclusions which can be drawn from all of the results will be presented in a summary at the end of this section.

TOTAL SCALE

Table 5 presents the total scale scores on both the pre-test and the post-test for each school, including the results of t-tests to determine whether the scores changed between administrations.

Before examining the pre-test to post-test changes, it is appropriate to determine the equivalence of the schools at the beginning of the study. In addition, the relative impact of age and sex must also be considered. Several attempts were made to define the age variable, and the most illustrative came from a mean split. Thus, age here has two levels, above the mean (21 and over) and below the mean (20 and below).

TABLE 5

Pre-Test and Post-Test
Mean Cognitive Scores by School
with t Values and Probabilities

School	Sample Size	Pre-Test	Post-Test	t	p<
Illinois Central College	25	29.76	32.24	4.15	.01
William Rainey Harper	31	33.94	36.84	2.22	.05
Prairie State	23	36.43	36.87	0.26	n.s.
Joliet	9	27.67	32.11	1.85	n.s.
Surry	15	28.93	29.33	0.29	n.s.
Allegheny	27	31.59	34.15	2.45	.05
Seminole	22	27.45	36.50	8.55	.01
TOTAL SAMPLE	152	31.41	34.54	5.95	.01

A Sex by Age by School analysis of variance was performed on the pre-test data. The age variable did not affect the results, and none of the interactions were significant. The students at the various schools did differ in their cognitive abilities at the beginning of the project, $F(6, 129)=3.84$, $p<.01$. Joliet, Surry and Seminole students performed significantly lower than the other students in the sample, while Prairie State students were significantly higher. In addition, the male students in the study began the study with significantly higher cognitive scores than the female students, $F(1, 128)=3.70$, $p<.05$. This finding was not surprising since previous research had indicated a similar result. It is important, however, as an indication of the validity of the scale insofar as establishing a similarity between the present study and previous work helps verify that the scale is measuring the same variables.

Comparison of the subscale scores of men and women revealed that the sex difference arose primarily from differences in ability to conserve perspective, $t(150) = 3.19$, $p<.01$, and the ability to use inductive reasoning, $t(150) = 2.40$, $p<.05$. The obvious link between these two tasks was their dependence on mental manipulation of spatial information. From previous research, there is evidence that men and women differ in their ability to solve spatial relations problems. Thus, the finding here is consistent with previous research.

The same analysis of variance was performed in the post-test total cognitive scores, and only the school effect was significant, $F(6, 128) =4.16$, $p<.01$. Surry again was the lowest school, with the remaining schools forming two distinct clusters. The first cluster,

Illinois Central, Joliet and Allegheny, formed a middle group whose performance was significantly lower than Harper, Prairie and Seminole. These results must be considered relative to the pre-test performance, and, as can be seen in Table 5, three schools demonstrated no changes in cognitive performance, while the remaining four had significant improvement.

Prairie State was the highest at both administrations, and their failure to change could well represent a ceiling level of responding. The amount of change at Illinois Central, Harper and Allegheny was approximately equivalent, and these students formed a distinct group on both the pre-test and the post-test. Joliet showed a large quantitative improvement; this increase was primarily in the formal operations scale, but the small size of the sample and the amount of variability make these data unreliable.

The most intersting comparisons are those of Surry and Seminole. Surry showed significantly lower performance than the majority of the schools on both the pre-test and the post-test. While the reasons for this failure to change are important for the more far-reaching purposes of the study, from a quantitative perspective they allow us to consider this group as a control condition. The students had been selected for the Surry program, which had the same objectives, yet the lack of any change indicates that maturation alone could not have accounted for differences observed in the other samples. Seminole students were in the lowest group on the pre-test but demonstrated a dramatic change in their cognitive performance by the post-test. Their response on the post-test put these students in the highest group.

The sex effect which had been observed in the pre-test analysis failed to emerge in the post-test scores. The advantage which the male subjects had shown in the pre-test data was not evident in the post-test. It is difficult to tell from the data exactly why this change occurred. One hypothesis might be that women benefited more from the program than men, but this is not likely since the Sex by School interaction was not significant, yet the schools did differ in their degree of improvement during the study. If women were being influenced more by the effects of the programs, one would expect differential improvements by schools.

An alternative explanation is that women changed more as an effect of maturation or school in general than did the men. The scores suggest that while the women actually showed slightly less change than the men on the concrete component of the scale, they made substantially more improvement than the men on the formal operations component. The important point is that the total score of the women improved more than the men.

Finally, it would be possible to argue that since the men started at a higher level, they may have demonstrated a ceiling effect. While this is difficult to prove or disprove, the men's starting level of performance was only 70% of the maximum total, and this score improved to 76%. These scores argue against ceiling level performance.

INDIVIDUAL ANALYSIS

The course of development outlined by Piaget suggests that across the period of the study, there should be a progressive improvement in the ability of subjects to perform more complex tasks. He has indicated that subjects in any stage should be able to successfully complete at least 50% of the tasks at that level.

To examine the changes across the term of the COMPAS project, subjects were placed into one of three categories based on their pre-test scores. Subjects who failed to pass more than 50% of the concrete operations tasks were categorized as non-conservers; those who passed more than 50% of the concrete tasks but failed to accurately respond to 50% of the formal operations tasks were identified as transitional, and finally those subjects who exceeded a 50% correct on the formal operational scale were considered formal operational. Table 8 shows the distribution of subjects in each category at each school.

TABLE 8

Piagetian Classification of Subjects
by School in Percentages

School	Testing	Concrete	Transitional	Formal
Illinois Central College	Pre	8	32	60
	Post	0	20	80
William Rainey Harper	Pre	3	22	74
	Post	3	6	81
Prairie State	Pre	0	8	92
	Post	0	0	100
Joliet	Pre	0	67	33
	Post	0	22	78
Surry	Pre	13	13	74
	Post	7	7	86
Allegheny	Pre	4	22	74
	Post	4	0	96
Seminole	Pre	0	55	45
	Post	0	5	95
TOTAL SAMPLE	Pre	4	31	65
	Post	3	14	83

In every instance, subjects who were in one category at the beginning of the study either remained in the same category or moved to a higher category. This is important since a fundamental assumption of Piaget's model is

that progress is irreversible; thus, no subject should score lower on the post-test than on the pre-test.

At every institution, the movement of the students was toward formal operations. The schools which showed the most dramatic change in the previous discussion of the quantitative results also showed the most dramatic shift in percentages of students toward the higher level, the result one would predict. The most notable characteristics of the individual data were the change in the total sample from 65% formal operational on the pre-test to 83% on the post-test, and the fact that at the beginning of the study 31% of the subjects did not give evidence of being formal operational. The latter finding agrees with previous research which has suggested that a substantial percentage of college students has not achieved the formal operational level.

THE RELIABILITY OF THE PAPER AND PENCIL SCALE

The use of a paper and pencil cognitive development scale is often seen as contradictory to Piaget's concept of evaluating individuals. Piaget generally used real-world observations combined with testing procedures which allow the person to view the objects under consideration. To assess whether the paper and pencil scale yields the same results as in vivo testing, the project schools were asked to use Piaget's procedure by testing a sample of the students who also completed the paper and pencil scale. The in vivo testing included three of the types of items from the cognitive scale: conservation of perspective, conservation of weight and the pendulum task (inductive reasoning).

Five schools, Surry, Joliet, Harper, Prairie State, and Illinois Central, submitted taped interviews with subjects, resulting in a total pool of 25. Table 14 shows the correlation of the in vivo testing with the cognitive scale including the subscales and a total score composed only of those items which appeared in both testing modes.

TABLE 14

Correlation of Paper and Pencil Cognitive Scale and In Vivo Cognitive Testing

Paper & Pencil Scale	In Vivo Weight	In Vivo Perspective	In Vivo Reasoning	In Vivo Total
Weight	.93	.89	.79	.91
Perspective	.79	.95	.83	.88
Reasoning	.77	.85	.92	.90
TOTAL	.90	.92	.92	.90

There was a very high correlation between the two testing modes, giving greater credibility to use of the paper and pencil scale. There were no differences in the magnitude of these correlations across schools; thus, no data by schools are presented.

ANXIETY RESULTS

The Spielberger State Trait Anxiety Inventory (STAI) was administered to the subjects in the sample as well as to control groups at each campus. The results of the pre-test and post-test administration of these scales are shown in Table 15.

TABLE 15

Mean Anxiety Scores at Each Administration for Program Students (E) and Controls (C) at Each Campus

School	Group	Pre-Test State	Pre-Test Trait	Post-Test State	Post-Test Trait
Illinois Central College	E	37	42	38	40
	C	36	37	37	38
William Rainey Harper	E	38	40	38	40
	C	37	37	38	39
Prairie State	E	35	33	36	35
	C	36	36	36	37
Joliet	E	39	41	37	41
	C	--	--	--	--
Surry	E	38	31	41	43
	C	38	39	39	40
Allegheny	E	37	38	37	37
	C	38	38	38	37
Seminole	E	41	38	40	39
	C	38	35	37	37

There were no school differences or between-group differences when these data were analyzed using a School X Group analysis of variance. Apparently the subjects at the beginning of the study were not different from the control groups, nor did their involvement with the program affect their anxiety level. This variable was included because the anxiety level which an individual brings to a situation often influences performance. Thus, the failure to find differences on this affective measure, while differences did emerge on the cognitive measure, suggests that the cognitive differences were not directly attributable to the level of arousal which the participants brought to the study. Finally, further analysis indicated that neither age nor sex affected the STAI scores.

SUMMARY OF QUANTITATIVE RESULTS

The quantitative data yielded results which lead to several conclusions. First, the cognitive scale constructed for this study was reliable and gave several indications of validity. This adds to the strength of the conclusions.

The major conclusion from the cognitive data is that the programs at the various schools were able to effect a change in cognitive performance, though the magnitude of the change differed between locations. The explanation of these differential changes will be an element in the compromise between the qualitative and the quantitative results. However, it is important to demonstrate that changes in cognitive performance consistent with the theoretical model proposed by Piaget can be implemented in college settings, and optimal conditions for designing these interventions can be defined.

The data from Harper broaden one's understanding of the program by suggesting that any attempt to determine which students will benefit from the program on the basis of pre-enrollment scores is unwarranted. Additionally, there was no evidence that the cognitive measure, the placement tests or the ACT predict classroom performance. Thus, while the level of cognitive performance for individuals did change, there was no evidence that this type of functioning was represented in the measurement devices used to determine course grades. These results must be interpreted cautiously since they are based on only one small sample, but they certainly provide a direction for further investigation.

The final quantitative measure, the Spielberger State Trait Anxiety Inventory, indicated that the sample of students in the project did not differ from a set of control subjects on either their present or more fundamental level of anxiety. This is important since a person's anxiety level influences performance, and would suggest that in the present study this difference does not account for the variations in cognitive performance. The possibility cannot be ruled out that when elevation of anxiety occurs, in a testing situation for instance, the program subjects may be more affected. It is likely, however, that this measure represents the instance of variable which does not distinguish the program students from other students on their campus.

5

REFLECTIONS

Site Director's Reflections

Project CREATE

by Scott Stevens

One of the most rewarding aspects of the program is its potential as a medium for faculty development. The interaction with colleagues and the opportunity for reflection on teaching methods are outstanding. Many pedagogical techniques developed for the program have been incorporated into other classes taught by the project faculty.

Having the institution choose the students for the program rather than allowing the students to choose for themselves has drawbacks. The students need to have the option of entering the program. Placing students in the program without their knowledge and consent can lead to resentment, no matter how well-intentioned the act or how good the program.

Education majors proved particularly well-suited for the program. Like most entering freshmen, the majority were at the concrete level. Even those already at the formal level gained by the approach because they could see the application of this teaching method to their future vocation.

Surry's administration made every effort to help the program, and every possible consideration was given to requests from the program. Still, it would have helped to involve the administration further. More participation in routine program operation would give administrators a better understanding of the program and develop their vested interest in its continuation.

Site Director's Reflections

Project DOORS

by Dick Thompson

My involvement in the DOORS Program and the COMPAS Project has resulted in some of the most rewarding, satisfying, and challenging experiences of my 23-year teaching career. Participation in the DOORS Program has given me the opportunity to associate with the most dynamic, creative instructors at Illinois Central College. By the same token, I was impressed with the overall quality of the individuals at the six COMPAS sites. Working with all of these people -- DOORS and COMPAS -- in a cooperative venture has enabled me to become a more effective classroom teacher. I have not only been made aware of the needs and concerns of other teachers but also those of students.

Practically every community college in the nation provides remedial programs for those students with serious learning deficiencies. Also many schools have developed or, like Illinois Central College, are in the process of developing honors programs for the gifted students. But what about the average or just-below-average students? What about the students who are "marginal" or "under-achievers," and want to enter transfer-degree programs? And what about those that come to the community college, but are uncertain of their career goals, or those that are returning to school after a long absence? What programs and/or opportunities are available to these students? The DOORS Program at Illinois Central College, and those developed at the COMPAS sites, answer a pressing need that exists at most schools. These programs offer students a new, unique way of beginning their college careers. I am very happy and proud to be associated with both of these projects.

Site Director's Reflections
Project LIFT

by Pearly Cunningham

As site director, I went into the project hoping it would bring two things to South Campus:

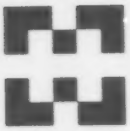
1. increased concern for formal thinking and its expression by students, and

2. a crossing of the gaps between the science and humanities areas.

The Learning Cycle method is one I have used for some time in teaching introductory classes. I still feel it is a viable, perhaps the best, way to present material to the person new to a discipline. The materials developed by the staff of Project LIFT are very good, and faculty are using them in classes other than their project classes. It is difficult for faculty teaching eighteen or more credits each term to find time to reflect on what has been done, what didn't work, and how a certain process could make it better.

However, through this reflective process education improves, and teachers develop professionally. I feel that this phase of the project was successful. There have been changes in the way staff presents material, especially increased sensitivity for presenting material at the student's level. Also, project faculty required more coherent writing from the students.

Unfortunately, for reasons cited in the report, we did not succeed in the goal of reaching a common group. If starting over with the present experiences, project staff would bypass normal enrollment channels. What remains is for the project to spread to a greater number of faculty. In the past, concern has been expressed on campus over faculty development, but this is the first project to attempt to influence teaching across department bounds. We on the project are still trying.



Site Director's Reflections

Project PATH

by Betty Windham

The invitation for Harper to participate in the COMPAS project came in 1977, when declining enrollments caused the administration to initiate aggressive recruitment efforts and investigate ways of improving student retention. This made my job of selling the project to administrators and the Board of Trustees much easier because prior evaluations of the DOORS Program at Illinois Central College had shown that student retention was a significant outcome of their program. To ensure similar outcomes in the PATH program and to provide a mechanism for feedback between students and faculty, I felt that a counselor should be an active member of the program team.

In reviewing our first year's program, I am still firmly convinced that a major factor contributing to our program's success was the interest and active involvement of the program counselor. Besides supervising the recruitment, screening, orientation, and registration of PATH students, our counselor taught a one-hour Human Potential Seminar for PATH students. Activities that took place during the seminar between students or between students and faculty helped form a close-knit student group and break down tensions that frequently exist between students and teachers. Continued academic and, for some, personal counseling of PATH students has helped the staff maintain close contact with them.

A second component of the PATH program which proved very effective and which I would recommend to anyone interested in setting up a similar program on a community college campus was the Reading/Study Skills course. Since we recruited students from the second and third quarters of their high school classes, many of whom were under-achievers, this course provided instruction in study skills requisite for a successful academic experience. In addition, the instructor was able to use assignments from other PATH courses as real-life examples for teaching reading strategies.

Weekly staff seminars proved as effective a tool for faculty development as they were for program development. Interchanges about students' progress and reactions to various aspects of their courses and the program provided valuable insights and reinforcements for the faculty, who often became frustrated by students' seeming lack of progress in developing reasoning skills and understanding course concepts.

Seminars and well-planned courses notwithstanding, the program would not have gotten off the ground if it had not been for the dedication and commitment of the PATH faculty. Open to new ideas, willing to try new teaching methods, and deeply concerned with the intellectual development of their students, they were the driving force that brought about the success of PATH at Harper College.

Site Director's Reflections

Project RISE

by Glenn Schmitz

Overall, the program went very well during the first run-through. We had some problems selecting students for the program, and now I realize that to do a good job in recruiting, we must get started early. That is one thing I would change by starting in the fall to recruit for the next fall semester. In addition, I would send out a brochure with every request for an application of admission to the college so that awareness of the program would be increased.

One problem in our program was the reluctance of some faculty to share materials. This is a must in such an instructional program because sharing materials is the only way that ideas can be bounced off one another. The end result is a stronger set of program materials.

In running the program again, I would seek a commitment from the faculty involved to meet regularly to discuss problems. This was a shortcoming in our program. I believe it is also important for students and faculty to sit down periodically and interact honestly.

Being associated with such a program has brought a certain amount of prestige to our school and myself. I have enjoyed sharing the pluses and minuses of the program with others on the phone, and presenting aspects of the program at professional meetings.

It gave me great joy to see a change in some of the project faculty and to see that some materials that they have developed have been incorporated into their courses. This faculty growth has helped the college.

I have learned that the program director must fill a number of roles in the program. He or she can't take anything for granted and must constantly look for things that can go wrong. One reason our program did not run this year was a breakdown in communications with the incoming students at orientation, which resulted in no students enrolling in the program. The director needs to have time to check all these pitfalls, such as making sure that courses in the schedule have been flagged to exclude students not in the program, and checking applications and transcripts with the counseling department.

Site Director's Reflections

Project STARS

by Alexander Dickison

One question that eventually must be asked of any activity is whether the results are worth the effort. This is particularly true in my situation because the only reward I get for doing a good job is personal satisfaction. The reward I received was great; in fact it is probably one of the most important reasons I am still teaching.

Before this project, I was somewhat cynical about education, and had begun to feel that the educational bureaucracy had grown to such an extent that no one really cared what anyone learned anymore. This project showed me that there still exists a solid core of excellent, caring faculty who put teaching ahead of everything else. This faculty shared with me their knowledge and feelings and rejuvenated my desire to teach.

I also feel the project dealt with important issues in education. We were attempting to put student thinking above subject matter content. In our project, it became more important for the students to think than to memorize facts. That to me is what a college education should emphasize.

In addition, the students enjoyed the program and benefited from it. What more can be asked?

Site Director's Reflections

Project STEPPE

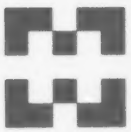
by Wilbur A. Miner

To say the project was worthwhile and valuable is a gross understatement. My purpose for getting involved was a long-standing desire to improve my teaching, to try something different, to investigate alternatives, and to share the effort with someone else. At no time did any of us think of this as the final answer to our teaching problems but rather as something that could be used and incorporated into our present programs. The ideal would be to repeat the entire project. We stumbled many times and made many errors.

In reflection, I would want a stronger commitment from the administration. I would recommend a faculty committee to monitor and evaluate the program. This could be a standing committee like a curriculum committee which could also aid in communicating with the administration and the rest of the faculty. We were fortunate to have a talented, dedicated staff from Illinois Central College to help in training and leadership.

I see the project as an ideal opportunity for some teachers to grow by trying an alternative to their teaching methods. There was certainly no evidence that any students suffered because of it. It did create a lot of frustration and some anxieties for the teachers, but this only produced some positive deposits in their warehouse of teaching skills and made me feel good about the whole project.

There is no one way to teach, no best way, and any time we can offer viable alternatives to an already good teacher, we can only gain in the end.



The PATH Mathematics Courses

by Therese Butzen

Two courses in mathematics were selected for PATH students, and placement was based on performance on a skills inventory. Very little flexibility is practical in teaching elementary algebra, the lower level of the two courses, because a large number of new concepts and skills must be mastered due to the course's placement in a sequence of math courses. Discovery-based activities had to be infrequent and consume little class time.

We placed almost all students who had demonstrated mastery of elementary algebra into Liberal Arts Mathematics. Because this course is not in the technical, business, or engineering math sequences, it does not have a igidly defined syllabus. Therefore, there was enough flexibility to include many activities designed to develop problem-solving abilities.

Students were disequilibrated because this approach in a math course was so different from any to which they had previously been exposed. They resisted being asked to think instead of being given a set of steps which, if memorized, would always work on a particular type of problem. There is a place for both teaching strategies, but math teachers rarely have the luxury of time to make a significant effort to develop students' general reasoning skills as I did in the PATH program. I regard such skills as necessary for students if they are to apply mathematics to real-life situations.

I enjoyed the concentrated exposure to faculty in other fields and learned from them as we worked and struggled together to implement activities that would foster growth in reasoning skills.

The PATH Human Potential Seminar

by Nancy Fojo

The Psychology 110 Human Potential Seminar which I taught as part of the PATH program had a two-fold purpose. The staff decided that to create and maintain an esprit de corps among the PATH students, a weekly meeting was necessary. The Psy 110 class time included get-acquainted activities; students shared their perceptions and problems about their coursework; study groups were formed; and on several occasions, all PATH faculty attended these get-acquainted activities and student feedback sessions.

The second purpose of the class was to provide career exploration and planning instruction. Since a criterion for admission into the PATH program was indecision about a college major, this aspect of the course was intended to be emphasized. In my final analysis, however, the seminar part of the course was more beneficial and more important to the students. The opportunity to discuss course progress, or lack of it, and feelings and perceptions about the program transmitted a student-centered attitude not often found on large college campuses. I still see and counsel last fall's PATH students, and they continue to see each other as well.

In addition to facilitating the Psy 110 course, I assisted in the recruitment, selection and orientation of the PATH group. Each member of the PATH faculty team participated in this endeavor, which contributed to positive faculty attitudes toward our student group because people support that which they help to create.

My frustrations about the program centered mainly on time. It always seemed as if there was not enough time for PATH faculty meetings, for class, and for student appointments. I labored to organize the class sessions, only to cast my well-laid plans to the wind so students could express their opinions, form a study group, or talk about some issue. While I felt this was necessary and positive, it did detract from formal presentations on career exploration.

For me, the most positive aspects of the program were the interactions and friendships formed with my fellow PATH instructors. We gained great insight into and appreciation of what each of us does as teacher or counselor. If each member of our faculty could experience what I have over the last two years, Harper College would have the most well-integrated, complementary faculty in the country!

Thanks, COMPAS!

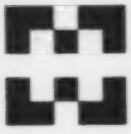
The PATH Reading Course

by Lee Kolzow

Teaching Reading 104 could be described as a reading teacher's dream as far as the assignments and classroom activities were concerned. My curriculum was tailored to the other PATH courses, so I was able to teach reading using real world examples: the students' assignments. This was very important because reading is often taught as an isolated skill. During the PATH program, reading never had to be taught as isolated skills, but was always presented as strategies relevant to the reading assignments given by other PATH teachers.

My main frustration with the program centers on the time factor. I never had enough time to cover the amount of material. This was true especially for the poorer readers who needed remediation but never received direct instruction or practice in lower level materials. Because we were using the political science text, the English readings and the physical science materials, the instruction took place in grade 16+ level material. Often the students lacked the vocabulary or kinds of experiences needed to cope with the required level.

Generally, I feel I made a positive contribution to the program and that I was an important cog in the PATH machinery.



The PATH English Courses

by Frank E. Smith

The PATH program has been an important learning experience for me and my students. I have had an opportunity to rethink my approach to the theory of teaching while developing some skills that have had immediate application to most of my other classes. In fact, by tailoring those skills and methods, I have been able to be more effective in higher level courses. Study of the learning theory of Piaget and others has confirmed but modified my beliefs about the conduct of teaching. I believe that I now have more evidence to support the intuition on which my teaching has been based. Specifically, I can now argue more convincingly against behavioral education. Also, I learned a great deal working with other faculty in a close, cooperative, conflicting situation. Higher education has always emphasized the instructor's isolation and individuality. I still believe in the value of that, but I am aware of the limitations of extreme individuality. I originally approached the PATH program looking for personal growth opportunities, and it has provided them.

The PATH program also seems to have been good for most of the students. Whether they have all learned to think better is unclear, although some of them did learn to think about better things. In any case, the program defeated the usual impersonal, indifferent environment that most students encounter at a community college by providing valuable encouragement and support between students. More importantly, some students' attitudes toward education have changed. They have been able to see, because of the interlocking classes and increased casual contact with teachers, that the learning environment, while demanding, is not inherently undecipherable or hostile. Student failure to learn may often be understood as a function of perceived student-teacher conflict. By setting up essentially non-threatening relationships, we have been able to redirect student attention to success as an outcome of ability and effort. That lesson may be the most valuable.

The PATH American Government Course

by Molly Waite

Given the opportunity to prepare an experimental course in political science, I set out with great expectations. I hoped to develop perfect learning cycles and to stimulate students so their behavior patterns would change. Due to these high hopes, I encountered tremendous frustration with my American Government course in the PATH program.

My learning cycles proved overly difficult because they required too much prior knowledge by the students. The assignments did not always teach what was intended, nor were they consistent from the exploration activity through the application. Students were frustrated by my questions in class and by vague assignments. I, in turn, felt angry at being so ineffective. From the beginning to the end of the semester, I was not aware of great progress by the class in general. Some students failed or dropped out along the way, which increased my sense of failure, since I thought that, with more time and attention from me earlier in the semester, they could have been salvaged.

Looking at the positive side, I acquired a much more realistic perception of my students' backgrounds and skills. Thanks to my supportive colleagues in the program, I was able to understand some academic problems I was encountering with the students. The PATH program also gave me the time and support necessary to develop a more experiential course in American Government. As a result, my teaching approach in this course and other courses has changed, even though it has not been totally implemented in each case. The experience has convinced me that the lecture (or "spray and pray" metnod) is not very effective and can be replaced by more hands-on-type projects.

Working closely with my colleagues for over a year has been another advantage of the PATH program. They provided reinforcement and encouragement during the rough times. I also found their insights helpful in analyzing student reactions and class performance. Moreover, my colleagues and I had the unique opportunity to take a group of students and to examine it from a variety of perspectives. In addition to seeing how individual performance differed or stayed the same in various disciplines, we were also able to learn more about our students' social and emotional dimensions.

The PATH Physical Science Course

by Betty Windham

Having had the opportunity to teach physics for a year in the University of Nebraska's (Lincoln) ADAPT program for college freshmen, which also utilized the Learning Cycle based on Piagetian theory, I was most enthusiastic about introducing this method into the physical science course for our PATH students. Trying some of my learning cycles out on the rest of the program faculty during our weekly seminars gave me the feedback needed to make them more meaningful for community college freshmen.

For the most part, the students found this approach effective and challenging. However, despite their good will, they often complained about not having a textbook, of having to think, reflect upon their conclusions, and provide explanations of why they solved a problem or performed an activity in a certain manner. "Just tell us what you want us to learn" was not an infrequent response in the class. Of course, this would frustrate the most motivated instructor.

I should have allowed more time for certain activities than I had originally planned so that students would not become overly frustrated and would have sufficient time to self-regulate when new concepts were introduced. Because of this, I did not get to use as many learning cycles as I had planned. By the end of the semester, I was a little upset with myself and the students because we had not covered more material.

However, early in the second semester, my faith in this teaching method was quickly reinforced during the second half of the same course, which four PATH students elected to take. Although I taught this half of the course using a text which employed a more traditional inquiry approach, these four students surprised me with how well they applied what they had learned first semester in the PATH program course.

Onward with Piaget and the Learning Cycle!

The RISE Chemistry Course

by Jim Herbach

The RISE philosophy was used in the first semester of a two-semester sequence course in general chemistry. Therefore, there was a lot of pressure to prepare students to compete in the second semester with those who had taken a traditional course. It would have been better to offer the second course in the sequence or to offer a RISE chemistry course that had no continuation.

Students began relatively cheerful but seemed to lapse into boredom as the semester progressed. The teacher's innovation decreased steadily, and he ended the semester teaching in a traditional manner. Perhaps preparing the second half of the course first would have been useful.

I was forced to think more about principles and to research the history of my subject more, an experience that should be shared by all, because in chemistry we tend to become so involved with mathematical exercise that the subject's beauty is hidden.

The STARS Mathematics Course

by Bill E. Jordan

I have long been aware that most remedial programs are doomed from the beginning. Additional drill and memorization presented in the same old manner are not the solution to learning difficulties. Students will become better students only when their thought processes and reasoning abilities have been changed.

But the nagging question has always been, How does an educator do that? This question led me into involvement in this project because I saw a potential answer.

The thought processes I used in writing the learning cycles made me more aware of similar reasoning patterns used by my students in order to understand the concept I was trying to convey. In discussing the cycles with my students individually, I noticed fallacious reasoning of which I was not previously aware. I was forced to take a close look at how my students were thinking, what was causing them to make errors, and how I could change their manner of thinking.

I also found meeting with, talking to, and often disagreeing with instructors in other disciplines to be very interesting because this led to a much better understanding of other disciplines and to the realization that what we are all doing really isn't that different.

The most rewarding part was that, after all the hard work, all the sleepless nights trying to decide how to write a cycle on a particular topic, and all the frustrations when a cycle didn't work, to find that our program actually works! Students are changing their reasoning patterns and thinking on a higher level because some faculty members cared enough to spend a lot of time trying something different to help them.

I don't know what the future of our program will be because both students and educators are so steeped in tradition that they are usually unwilling to try anything new. However, I believe it would be tragic if programs like STARS that have produced such dramatic results are simply allowed to die.

The STARS Humanities Course

by Aimeé Mason

As a philosopher by training and degree, I have in the past used the learning cycle concept in my philosophy classes. It is obvious that any philosophy student must attain the ability to think broadly and abstractly. As a teacher of humanities, I also teach in so-called learning cycles because the student must learn and understand broad concepts. Humanities courses by definition are interdisciplinary.

The advantages most apparent to me in using the Piaget method are smaller, more informal classes, and the fact that many students know each other from other STARS classes. However, a class of 27 is a little large for a Piagetian approach, and I regret the necessity for having classes of that size. In a class of 25-27, it is difficult to allow time for all students to participate in discussions.

As I see it, the Piaget method should be used long before a student reaches the college level. I have seen some borderline students helped greatly by this method, but they are students who will not ever be able to think abstractly.

I find the meetings with other STARS instructors most helpful. There it is possible to discuss the problems of individual students shared with other instructors.

The STARS Earth Science Course

by Lawrence A. McAdam

In graduate school at Florida State University, I first became aware of Piaget's work and theoretical implications for education. After graduate school I returned to teaching, knowing some theories of Piaget but understanding little of their application to the classroom. Through the COMPAS project, I was exposed to the "nuts and bolts" application of his work. Eureka! I realized that Piaget's theories could work in the classroom.

I have grown professionally by participating in the project. Rewriting curriculum into learning cycles forced me to re-evaluate my courses from the students' point of view. Also, working with teachers in other disciplines has been rewarding. It is important to know what is going on outside your discipline and to realize that the patterns of thought are the common threads that tie the educational program together. From this experience, there has been a rebirth in my enthusiasm for teaching.

Students' reactions to the learning cycle range from liking the involvement to feeling that there is too much work. Overall, students react favorably because they take part in their own education, which fosters self-directed learning.

The STARS English Course

by Dorothy M. Morrison

As a veteran English teacher, I have been gratified to find in the STARS program a "shock of recognition": things I have long believed and tried to practice have a valid base in learning theory. Moreover, I have long insisted that it is both possible and beneficial for students and teachers alike, even in large and increasingly impersonal institutions, to share concerns and perceive the relationships among various disciplines when provided with such a program as STARS.

It is, for instance, more than satisfying to find myself totally understanding and in sympathy with Bonniejean Christensen, who, along with her late husband Francis, is a leading advocate of bringing sound scholarship to the teaching of composition.

> "The four modes of discourse can be reduced to two: representational and discursive. The first can be understood as picturing appearance (description) and picturing behavior (narration), the second (whether exposition or persuasion) as talking about its topics. The first is concrete, the second abstract." [1]

Thus the Christensens have provided me with strong cues to distinguish examples of concrete and formal thought in student writing and a theory-based rationale for organizing sequences of compositions so that students will be given the means of moving toward more formal thought processes as well as to use both concrete and formal processes for optimum effectiveness in writing.

As a product and advocate both as a student and teacher of the "school within a school" philosophy of Atlanta's Bass High principal, W. Joe Scott, I early in my life profited from taking most of my classes with students who shared the same teachers. This grouping seems to me to provide students with opportunities to make connections among subjects and to enhance the teachers' opportunities to confer with one another about students' progress. The STARS program has restored to me the sense of a genuine camaraderie among participating students and teachers. Additionally, as I move into my second semester in the program, I am already sensing a continuity and carry-over from one term to the next among STARS participants.

Therefore, the STARS program has given me, and I think students too, a very real sense that in education, sound intellectual scholarship and camaraderie make very agreeable companions.

[1] *Bonniejean Christensen, The Christensen Method: Text and Workbook, (New York: Harper & Row, 1979), p. xiii.*

The STARS Career Exploration Course

by Anna Wilcox

Career Exploration has been a three-credit course at Seminole for many years. When the STARS program was organized, I felt it would fit in perfectly. This course is designed to provide students with an opportunity to explore themselves and the world of work, to acquire the tools of rational thinking as they relate to decision-making, and to apply these tools to real-life situations. This is a tall order but one tailor-made for STARS students because the class encourages students to examine themselves in a supportive atmosphere.

As a facilitator, I presented the material, and the students designed the format and created the growth experiences. I sometimes felt like a referee, other times like a counselor but always like a friend. Our STARS students almost seemed like a theater troupe, enjoying lively discussions and role-playing sessions, and developing a real camaraderie.

As the semester unfolded, my concern was perhaps an unusual one. We, as faculty, had worked hard to help the students over the hurdle of entering college, establishing a good rapport, and providing a firm foundation for future success. Had we, in the process, given too much shelter, setting them up for failure when they entered the "real" world of college? Happily, my fears were unfounded. Our students are doing well and are still in touch with all of us.

The STARS program has been a wonderful experience for me. Becoming involved with a dynamic group of educators, establishing friendships, and sharing within our STARS faculty have been extremely rewarding.

The entire college has been supportive and shared the STARS enthusiasm. STARS is alive and well at SCC and still growing, thanks to the local and national leadership.

The STARS English Course

by Stephen C. Wright

The STARS program seems to bring out the best in each student. Students seem to want to address issues and to solve problems from their own points of view. What is remarkable about this is that through the common exercises in equilibration, students also come to respect each other's opinions.

The atmosphere created is different than that which surrounds a superficial kind of harmony in which nothing of value is gained through innovation. The atmosphere surrounding the STARS class is one of harmony, but it is a harmony out of which are generated intellectual inquiry and discovery. This would not be so unique except that the inquiry and discovery are processes by which students can actually see and feel the benefits of a broadened outlook and the application of this insight to their studies and to their daily lives.

The major aspect of this approach is that it broadens, in most instances, students' thinking. As such, the emphasis must not be the mere coverage of as much material as possible but the helping of students to understand and to appreciate the process of generating substantive thought.

EVALUATOR'S REFLECTIONS

by Dr. Melvin Hall

In a very real sense, quantitative and qualitative data sets collected during the evaluation each served to expand the interpretation of the other rather than provide confirmation or disconfirmation. Quantitative analysis focused largely on the concerns of cognitive development, the primary target of COMPAS. Qualitative analysis proved most useful in revealing complicating factors and variations which altered or limited interpretation of those quantitative data. This latter set of qualitative data provided very weak judgments of impact on cognitive functioning.

Reconciliation of the two data sets is thus more a task of weaving together the inferences resulting from each set than of confirming one inference with supportive evidence from a second perspective. In some instances a common theme is discerned, though for most concerns only questions arise as the two data sets are merged.

STUDENT CHARACTERISTICS

One area where more questions emerge than are answered, is that of the role of student characteristics in determining project outcomes. First, just who were the students involved in COMPAS? Does the relatively low level of Seminole student performance on the pre-test reflect a higher percentage of "high risk" students, or does it simply reflect a valid cross-sectional comparison of students among the schools? Further, it seems important to note that the selection procedures used by each school may also have affected the ability levels of students at each site.

Initial design statements for this evaluation included a comparison of students across sites through use of the CGP results on each campus. These scores would allow some assessment of the comparability of project students. Based upon the Harper case study, CGP data seem to be the most appropriate source of comparison since they appear related in some way to subsequent cognitive performance measures.

Resolution of this question of comparability of student populations raises yet another consideration since the CGP is clearly a preferred instrument for cross-campus comparisons. What specifically makes the CGP more relevant in predicting later cognitive functioning results? Is there a discernible profile or dimension of comparison? Would the ACT scores have been a better predictor if the student pool had included higher ACT scores, i.e. over 21?

The combination of the complex interactions of these measurement devices and contemporary notions of ability with the varied campus

recruitment plans resulted in a picture too complex to allow concise determination of the basis for initial differences between pre-test scores. Too many possibilities existed as explanations of the differences in pre-test performance. The impact of student ability and other characteristics on the success of the project approach poses important, interesting and unanswered questions about the COMPAS effort.

IMMERSION

A second major area of comparison between quantitative and qualitative data produced interesting consistency in ratings of the expected and measured levels of project impact. By combining several descriptive characteristics, each of the six new cognitive programs could be rank ordered on a composite characteristic labeled immersion. Factors included in this ranking were: number of courses offered, number of project course hours expected or normally taken by students during the project term, the success of block scheduling, the success of coordination efforts, reported learning cycle use levels, and a general level of project support from the host institution. For each factor, an informal rating of each project was developed and later combined to rank order the level of change in student performance expected at each site. Upon comparison with the "t" value for changes in formal reasoning, this rank ordering of project sites demonstrates fairly good consistency. Qualitatively and quantitatively obtained rankings were:

Quantitative -- Seminole, Harper, Joliet, Allegheny, Surry, Prairie

Qualitative -- Seminole, Harper, Prairie, Joliet, Surry, Allegheny

Thus, with the exception of Prairie State, these rank orderings were quite consistent.

In exploring how the ratings might have also picked up on the Prairie phenomenon, an analysis of the ratings brings little clarity. Essentially, the informal ratings were obtained as follows: points were assigned to each site based upon interview data. Three years of interview data were reviewed, using both student and faculty responses. Table 16 reviews the point distribution.

The ratings associated with each institution reflect the levels of success reported by project staff in interviews. The basic premise of the ratings was that the intensity of students' experience would directly affect the impact of project participation. Using a three-point scale, with one reflecting minimal success, this informal scale provides only a very general assessment of student immersion or project intensity.

TABLE 16

	Allegheny	Surry	Seminole	Harper	Prairie	Joliet
No. of Faculty Involved	5	3	8	6	8	6
No. of Courses Taken by Typical Student -- Fall Term	1	3	4	5	3	3
Success of Block Scheduling	1	2	3	3	2	2
Success of Coordination Efforts	1	2	2	3	2	1
Reported Levels of Learning Cycle Use	3	3	2	2	2	2
Institutional Support	1	1	3	3	2	1
TOTALS	12	14	22	22	19	15

BLOCK SCHEDULING

The primary tracker of block scheduling impacts (STAI) failed to establish any significant differences between schools or between pre- and post-administrations. Conversations with faculty and students, of course, resulted in a variety of statements. When combined, several ideas seem to be suggested by this occurrence. First, students consistently across sites denied a link between the success of block scheduling and reduction of their personal apprehension about school. Specifically, students at Harper and Seminole continued to report anxiety at the end of the project term, despite their assessment of the positive features of block scheduling.

The primary factor reconciling these remarks is the direction of the impact of block scheduling. Students and faculty had tended to describe block scheduling in terms of its impact on functioning in the small groups associated with COMPAS classes. Perhaps the assumption that any easing of these in-class relationships would generalize to general anxiety about college was unwarranted. In other words, the anxiety reduction associated with block scheduling may not generalize beyond the classroom.

The dilemma which results, however, is how to explain improved retention and increases in the number of science and math courses project students

seemed to take. Further, when several students reported specific areas where they felt advanced over other non-project students, reduced overall anxiety would have been predicted. From the data, it is not possible to definitively address these questions. It is possible, for example, that since the variance in reactions to block scheduling recorded from site to site was no larger than that on each campus, the overall impact seemed insignificant. It also seems plausible that as a factor, anxiety is simply too complex to track from one single variable such as block scheduling.

GRADING

Perhaps the most powerful question raised by combining quantitative and qualitative results relates to the prediction of final course grades in project courses. In the Harper case study, correlation coefficients relating final course grades and cognitive post-test scores demonstrate very low levels of association. One potential mediating variable was an element of immersion common to many project sites: At Harper the use of learning cycles trailed off after midterm. It was not clear, however, exactly how traditional the remainder of the term was. If instructors reverted to traditional criteria as well as delivery formats, then the superiority of ACT scores as predictors of course grades would make sense. If this were not the case, however, no obvious answer for the lack of relationship between one measure of course goals and final grades emerges from the data.

IMPACT OF COORDINATION

One cloudy area is the impact of tight coordination and the accompanying block-scheduling on cognitive development. Allegheny presented one occasion for exploring this since recruitment problems had eliminated these two features from that program. When the results of cognitive measures are reviewed, however, Allegheny's movement appears strong in comparison to others. Unfortunately, there are limitations in the data which do not allow any precision in such comparison. Since no uniform anchor for comparisons exists, it is not possible to determine whether the failure of block scheduling and coordination suppressed a stronger potential impact or had no real effect on outcomes at all.

A further limitation of the data is the imprecision of the immersion estimate used to rank order sites. At Allegheny, for example, coordination and block scheduling efforts did not prove successful, but a higher level of learning cycle usage was reported. Learning cycles were used more consistently as well as for a greater percentage of the semester. While there is no definitive support for this, it may be that the Allegheny results testify to the relative strength of the learning cycle technique in generating overall project impact. If this were so, any true immersion estimate would have to account for this by weighing the factors differently as in the beta weights of regression type equations.

IMPLICATIONS FOR FUTURE PRACTICE

By combining the best advice of current project participants with the inferences which may safely be drawn from project data, several implications for future practice may be drawn. When combined, these COMPAS lessons fall short of defining the ideal project, but do provide a point of departure for local project planning.

1. Recruitment

The clearest messages from current project sites are related to student recruitment and selection. First, the involvement of a college counselor or admissions staff member on the project team must be strongly encouraged, given this year's results. Further, it is crucial that project team members take responsibility for the entire student recruitment process. It is hoped that the presence of a counselor on the project team would insure a realistic target for enrollment levels, as well as identification of a broad enough target pool for recruitment.

Clearly students should be recruited into the program first and then actively screened to insure that appropriate students are not arbitrarily screened out. But it is also important that team members reach consensus on the type of student to be selected. Because recruitment is one of the few project activities which can only be done once, its initial success is quite important.

Most instructors indicated a preference for working with approximately 24 students. This classroom size might also drive global project enrollments unless a system is developed to handle the complex scheduling issues involved in organizing multiple sections of project courses. With a class size of 24, in-class groups of four to six students can easily be formed.

2. Courses/Instructors

In selecting project courses, a delicate balance must be maintained between the concerns of selecting compatible instructors and the equally important challenge of providing an attractive function core of course offerings. Course levels should be checked to insure that the courses involved do not overly screen students. Project team leaders should also teach project courses as a way of promoting credibility, ensuring that they will not have a radical shift in priorities, and nurturing their interest in project concerns. Instructors might also consider staggering their involvement to provide a two-platoon teaching system, though the second term might be smaller than the first to allow students more flexibility.

Some block scheduling seems warranted though its purpose is perhaps best restricted to facilitating coordination of materials with only a natural level of social support built in.

Apparently if block scheduling were emphasized too much, it began to usurp the power of the teaching approach by fostering an unreal classroom environment. Tight block scheduling does not appear to improve project functioning commensurate with the limits it places on project activities.

3. Institutional Support

Another very clear area of signals from current projects supports the notion that college officials should be the first recruitment targets for team members. When school administrators were informed about the project and provided with updates of its activity, institutional support played a key role in project success. Of course there is no definitive proof that team members controlled this relationship. Clearly, on some campuses, key administrators are predisposed to become involved in funded projects. But regardless of the initial source, administrative support seems crucial.

One primary example of the importance of administrative support is the extra released time awarded team members at Harper and Seminole. Uniformly team members felt that release from one course during the spring term could not completely support development of learning cycles for a fall term course. Additional released time for development and concurrent released time for refining learning cycles were uniformly viewed as important.

4. Theoretical Base

A final area of concern is the level of understanding of Piaget necessary for a successful COMPAS-type program. Popular sentiment supported having a modest increase in the level of common understanding of Piaget and of the relationship between this global theory and the learning cycle approach.

It was anticipated that this would further promote dialogue on individual campuses and provide guidance to team members as various program options were reviewed. Further exploration of the theory would perhaps have clarified the modest potential of a student profile in predicting student success in the project. In general this use of theory would stabilize project conceptual focus rather than limit flexibility or creativity in project design.

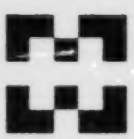
SUMMARY

The data falls short of definitively explaining the "whys" of the project's outcomes. Monitoring of several project effects warrants their being labeled results of the projects. At several project sites, for example, sizeable leaps in the level of cognitive functioning were observed for students who would be predicted as having the best chance for displaying such a change. At other sites, however, lower levels of change occurred, ruling out a general maturation explanation.

The data further points out the problems and promise of current practice in recruiting and maintaining project students. The uniqueness of individual sites clearly mediates against any blanket judgments of these practices, but does allow for current practice and results to influence future decisions.

Throughout the evaluation, several consistent limitations of talent and resources have curtailed the project view taken. No attempt was made to assess the impacts of various time schedules from campus to campus, for example. Also, no data on faculty was collected, a vital element for any immersion equation.

Beyond these and other difficulties, however, the evaluation has attempted to portray the real life variety and complexity reflected in COMPAS. For that reason, the evaluation agenda was laden with description and reflection. As a final or summative review of COMPAS, this evaluation perhaps best offers a panorama of what the project has represented to its varied constituency. In doing so, more questions have inevitably been raised than resolved -- yet in many respects that is the hallmark of exploration for understanding rather than explanation.



SURVIVAL OF PIAGETIAN PROGRAMS

HOW CAN PIAGETIAN PROGRAMS SURVIVE?

excerpted from a speech by

Robert G. Fuller

Director ADAPT and Professor of Physics
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A few years ago a group of people at MIT put together a paper[1] which was dedicated to Tactics for Change at institutions of higher education. Some ideas from their paper are related to our Piagetian programs and their survival.

DIFFICULTIES FACED BY PIAGETIAN PROGRAMS

Let us examine some of the difficulties our programs have encountered, for example: "The Entrepreneur Effect. Educational innovation is often due to the initiative of one person or a very few individuals."[2] If you fire or do not promote or do not give them tenure, then the innovation goes away. A few programs that have been committed to Piagetian ideas have gone away because of this.

Another difficulty is very closely related to the entrepreneur effect: "The Isolation of Infection Effect."[3] Name the innovation after someone. "By calling it Joe's new program, one is excused from becoming involved."[3] This happened to me in 1971. I was a budding young professor and began to use the personalized system of instruction which is called the Keller Plan by physicists. I started using it at Nebraska. Others in the department called it the Fuller Plan.

A third difficulty that comes up in dealing with Piagetian programs is related to "The 'Standard' Standard" game.[3] "An innovation encounters opposition ... (because others are concerned about) maintaining standards."[3] Piagetians have a different way of talking about knowing. For us, knowing is not measured in credit hours; it is not measured in memorized concepts. Therefore, the guardians of standards of your college or university will say, "It is all right to do ADAPT but it is not physics, or it is not political science, or it is not history, or whatever." People have been taken to task in their college by their colleagues because they say the Piagetian program is not academically viable -- "It's fine but it is not academic."[3] It does not meet the traditional standards and values of intellectuality. Therefore it is not appropriate at the college level.

Another difficulty, "The Prima Facie Affront. Whereas I have spent a significant fraction of my professional life perfecting my lectures and ... investing in the status quo, to suggest a change is to attack me,"[3] is a particularly sticky issue in dealing with tenured faculty. They have been

given tenure; they already know how to teach and have a fairly substantial commitment to the lecture notes they have developed during the years they were working on tenure. To suggest an alternative to their standard teaching techniques is considered a judgment or condemnation of what they have been doing.

Or consider "The Prima Donna Effect ... No one can tell me how to teach."[3] For example, the professor who has a distinguished teaching award from 1927 feels your suggestion that we may have learned something about how people think in the last 50 years is an insult, and while the idea might be OK, it ought to be modified to fit into the structure that he/she is already using in the classroom.

A committed faculty member can do almost anything in his/her classroom that he/she wants to as far as a teaching strategy is concerned. You only run into rigidities when you put together a program. One of the standard ploys of the university is "The Presidential Primary Gauntlet."[4] Remember in the U.S.A. the candidate has to run through 37 primaries. The primary sequence is the kind of program approval structure most universities have. If you want to start a new course, you have to write a description for the department; it has to be approved by the curriculum committee of the department, then the whole department, then the curriculum committee of the college, then the whole college, then the Dean, then the University Chancellor, then the Board of Regents, etc., etc. At every stage a number of people will think it has been done before or it's out of date. And that reminds me of "The Muscle-Bound Faculty -- The faculty as a whole has all of the brakes and none of the engines. There is a clear majority against anything you can mention."[4] In fact, it is absolutely incredible! You can almost get faculty to vote against a pay raise for themselves.

Another difficulty in institutional change is "The Conqueror-of-China Effect. For centuries China was able to assimilate one set of invaders after another. Academic institutions can swallow innovations without a trace." In 1971 I led a change in the physics curriculum at the University of Nebraska. We went from having two introductory physics courses over the next five years to having nine different levels of introductory physics courses. In 1981 we went back to three levels of introductory physics courses. The department decided to combine all of the physics courses for life science students into one. We are back where we were in 1971. Institutions have tremendous flexibility in swallowing up innovations and making them as rigid as the structure.

Finally, remember "The Anti-Logic Effect: ... educational innovations are almost never installed on their merits."[4] Even if an evaluator provides you with very positive data which you lay at the feet of your President, do not think he will embrace your program. Educational innovations are almost never installed on the basis of their merit, or on the basis of any kind of logical process as far as I can tell.

TACTICS TO OVERCOME THESE DIFFICULTIES

How can we overcome these difficulties? Fortunately the people at MIT put together a list of tactics for us to use. I want to discuss the ones we have found particularly successful. One that is very good they called "Wheel in a Trojan Mouse."[4] The idea is to start with a very small innovation which is the base of operations for a bunch of Greek commandos. In fact if you went to the University of Nebraska and asked 93.82% of the faculty about the ADAPT program, they would not have heard of it. The other 6% who would have heard of it could probably not name a single faculty member associated with it! We are a very small group. We think we have a big impact on the lives of students.

Another tactic must be stressed again and again: "Don't Ask Permission!"[4] If there is someone in your institution whose permission is absolutely essential, then that person has to be a part of your group. Don't ask permission too soon! Many academics forget a college professor has a lot of freedom to do whatever he/she wants, and so you do not have to ask permission.

"Be A Wolf In Sheepskin: identify some already established program and co-op this for your innovation."[3] This describes the beginning of ADAPT at the University of Nebraska. About three years before the ADAPT program started, a very innovative administrator at UN-L decided that freshmen had a difficult time adapting to life in the university. As one of our students said, "There are more people in my chemistry class than there are in my home town," so the university instituted freshman seminar courses. Every department was asked to offer a freshman seminar. What is a freshman seminar? In physics a senior faculty member sat down with a group of freshmen who thought they might be interested in physics, and they talked about the philosophy of physics. All the departments had started these courses, and by the time ADAPT got ready to start in 1975, the contents of the freshman seminar courses had nearly died. Freshman students could not deal with them, and the professors did not know what to do, but there remained a freshman course number in every department. We could institute a program held together by the commitment of the faculty and never ask anyone except our separate chairmen. We could say, "Remember that freshman seminar course that we do not know what to do with -- I would like to try it once." And so we put in the ADAPT program, which existed for four or five years, and no one really knew that it was there.

Now I can give you the counter evidence to the "Wolf in Sheepskin" tactic. Dr. K. Patricia Cross, author of the book, Accent on Learning, came to Nebraska as a consultant to improve undergraduate instruction. She obtained a quarter-of-a-million dollar grant for a new freshman

learning course, and the College of Arts and Sciences curriculum committee would not approve it! "Don't Ask Permission" and "Being a Wolf in Sheepskin" are very important if you are going to do a Piagetian Program.

A couple of other tactics have been important. I must mention "Manufacture A Mneat Mnemonic."[5] Some of you may wonder why all these Piagetian programs have some name for them, PATH, LIFT, DOORS, ADAPT, etc. If you don't have a program name, your colleagues will call it a Campbell program or Alex's program so they don't have to treat its view of the university with respect. They name it after you and let it go. So we have all gotten into naming programs. "Academic man ... lives by labels... finding the best name is often the single most difficult creative part of introducing a new product."[5]

"Play a Positive Sum Game"[5] is an important aspect of starting a program. Make sure that everyone who is involved in the program gets some positive benefits from being in the program.

"Pry With the Power of a Pittance."[5] -- Try to get as far as you can on very little money. One of the things we have never done at Nebraska is to allot any project money to academic year faculty salaries. The money we had was paid to develop courses in the summer. We have always had our classes taught as a part of the regular teaching load of faculty members at the university. I think this had a lot to do with our program lasting six years now. We have had a lot of persistence and have never had outside money to pay faculty to teach in the program. We have always taught in our program as part of our regular teaching commitment to the university.

"Establish Categories of Evaluation Yourself."[5] These projects are different from other kinds of things that go on in the university. You must decide for yourself what aspects of your programs are important and evaluate them. Do not get caught up in using traditional evaluation techniques.

"Keep House: Registrars can kill programs."[5] Counselors are also an important element in these programs. You have to recruit students for these programs so you need to have some way of getting students to sign up for your program. You must work with the registrar and the counselors so they understand your program and feel good about it. You might need a workshop for the counselors at your institution so they understand what your program is all about.

The largest core of resistance to Piagetian ideas is really with the faculty and not so much with the institutional structure. To overcome this resistance, you can use both "Invoke the Majesty of the Name"[5] and "Play the Conference Game."[5] You can say, "Well, I am a part of the great COMPAS consortium," or "They do it at the University of Nebraska," or "They talked about it at a conference in Denver." You can use the credentials of off-campus experts to convince people on your campus that what you're doing is all right.

I see "Cherish Diversity" and "Let the User Add the Eggs" tactics[6] as central elements in constructivist Piagetian-based programs. What we have in a Piagetian-based program is a way of understanding knowledge. I do not believe you can prescribe detailed behavior on the part of everyone in the program, and therefore these programs ought to have diversity. After comparing the various COMPAS programs, you will see that campuses are trying to design programs to fit their local needs. With a common commitment to a Piagetian perspective, we "Let the User Add the Eggs: The cake mixes that require only water to be added do not sell so well as those to which the customer adds the eggs."[5] The idea is to allow the users of a program to transform it, to add their own input for the local setting.

CONSTRUCTIVIST EPISTEMOLOGY

I do not think tactics alone can save our Piagetian programs. Our tactics have to stand on a solid foundation. This foundation has three basic features. It has to have CE, IE, and SC. What is CE? The C stands for constructing, for knowing is doing, at least mentally doing something. The CE stands for Constructivist Epistemology. What does that mean? It means that the point of view of Piaget and those of us who are trying to develop these programs is constructivist. We understand knowing to mean active mental processes on the part of the learner, not only on the part of the teacher.

Piaget distinguished two different kinds of knowing. One he called empirical knowing, which is how you learn as you act on external objects and experiences. How do you know to twist a knob to the right to open the door on your automobile? You know by acting on the knob, by doing something to it. Piaget is primarily interested in the other kind of knowing, which he calls logical knowing in which you ponder, or cogitate, or reflect, on your actions on the world. These are internal mental reflections about your actions on the world. This is the kind of knowing that Piaget argued is sequential. Piaget was interested in the interior process of knowing about the world by which you come to understand how to develop a systematic scheme for solving problems. What did Piaget say about logical knowing? He said it is constructed by the knower and is sequential. What does the knower do? He/she uses internal mental transformations, problem-solving strategies, or schemes, as Piaget calls them, in which he/she does some mental action on his/her experiences to make sense out of them.

As college professors we have been primarily interested in mental processes called formal schemes. We have a long list of those schemes such as proportional reasoning, i.e. the scheme of using proportions.

Another scheme is the "if everything else is equal" scheme, i.e. the separation and control of variables. There is also the "if ... then ... therefore" scheme which is the essence of hypothetico-deductive reasoning.

I have been trying to think of a metaphor for this kind of learning because I want to contrast this with some other metaphors of our culture. Let me talk about constructivism as a mental modeling clay concept of knowing. You have some basic internal components in your mind like pieces of modeling clay which represent the schemes you use. You can shape those to make sense out of your environment. For example, take a set of dice and a knower who is playing "Petals Around The Rose." The knower has some scheme already in his/her mind about roses and petals and dice games and how those things might all fit together. So the player in that game constructs an understanding of what the rules are. This understanding is an internal mental transformation of the sensory input the person gets from the environment and is matched to the mental schemes and organizational strategies that already exist in the mind of the person. Piaget understands this very much like a biologist understands homeostasis. The human being is trying to make sense out of the experience and wants to be what Piaget calls in equilibrium with the environment. This innate part of being human causes the students to learn new things. According to Piaget it is not smiley faces on the corner of the page; it is not M & M's when you get it right; it is this innate desire of a human being to know and understand and adapt in a cognitive way to his/her environment that provokes learning. Piaget has a word, equilibration, for this process of mental growth. We also use the word self-regulation, which is more like a cybernetics term, a feedback loop. It is the mental process that goes on as you try to make sense out of your environment.

Let me illustrate briefly what goes on in the process of self-regulation. Students don't come to the university with no ideas about physics at all. They have ideas, schemes, structures that they use to make sense out of the experiences they have with nature as described by the laws of physics. It turns out, however, that most people's schemes are easily contradicted by their experiences in a physics lab. Contradiction or puzzlement is the time when, according to Piaget's model, a person is especially prepared to make intellectual growth.

Notice the difference between this model and the learning theories you were taught in school. We were taught to chop knowledge up into small bits and make it easy for students to go from one step to another. Piaget's theory suggests that confusion and contradiction are the prerequisites for constructing new knowledge. As long as everything is going along and all fits together, the opportunity for students to make up new understandings is absent. When persons search for new relationships to resolve the contradictions between their experiences and their mental schemes, they are experiencing mental growth. All of us as professionals have had this experience.

The data we are taking, or some answers the students write, puzzle and haunt us, and perhaps days, weeks, months, or years later, we construct some new meaning out of the puzzling things. I argue that all of us as professional people have had experiences which show us this Piagetian way of talking about intellectual growth is valid. We puzzle over a problem, and finally something happens: maybe someone gives us a hint, or we have another puzzling experience, and we develop some new schemes or put old schemes together in a new way. This is the process by which we develop new and more adequate schemes.

There are some presuppositions for this kind of intellectual growth. It is assumed that the student is active at least mentally and that the student has some autonomy and is not following a strict list of rules and regulations that someone else has laid out for him/her. It is assumed that a learner is able to try a variety of things, to make some choices, and to be contradicted by his/her experiences. In other words a student needs to have freedom of action so that he/she can try things out and explore things for oneself. This is fundamental to the Learning Cycle model for classroom instruction. Another aspect of reasoning which is often missing in university classes is time for reflection. If you are really confused about something, you need to withdraw and puzzle it out, to figure it out for yourself. The resolution of a mental contradiction must be useful or meaningful and allow you to adapt more adequately to your environment.

This CE, constructivist epistemology, is a key element in the long-term survival of Piagetian programs.

Constructivist epistemology is in sharp contrast to many other current theories of education. The traditional one we all learned in graduate school is the so-called Empty Cup theory in which the students are empty and the professor has access to knowledge and fills them up. In this model of learning, the knowledge doesn't really go through the mind of either the professor or the student. Most of us grew up with an idea that you could stuff knowledge into your head. In fact I remember sleeping with a book under my pillow, hoping its content would soak into my head. This is a very different idea from the Piagetian one. In the cultural view of knowing, knowledge is exterior to the minds of people.

Another learning theory is a consumer model of knowledge. Knowledge is chopped up into credit hours, and the students have knowledge after they buy 128. I think it is appropriate that the degree is called B.S. Knowing is exterior to the mind of the student. You gulp knowing down like McDonald's hamburgers.

The Piagetian model of knowledge is really different from others used in our culture. According to Piaget, knowledge is constructed. It is activity on the part of the learner making more adequate schemes for the understanding experiences. What you want to do in a Piagetian system is to provide more and more variety of experiences.

I cannot emphasize enough how great is the difference between the Piagetian understanding of knowing and the empiricist models of our culture. Our culture sees knowledge as facts, content, concepts. At one time we had the $64,000 Question show on TV. We worship knowledge of trivial facts. That is supposed to be a great aspect of knowledge. Notice this kind of knowledge is quantifiable. It is external to the mind of the person. Many aspects of our culture, e.g. the back-to-the-basics movement, are more of the same empirical view of knowledge. "Kids are so dumb today, they don't know grammar." It is more emphasis on content and facts. I believe that empiricism, this view of knowledge, is an empty vessel for the future and in fact is being given up by scholars in most disciplines.

I see behaviorism in psychology as an example of this. All the psychologists at universities were trained as Skinnerians and ran rats for a long time. Now behaviorist articles have nearly disappeared from journals of cognitive psychology. And even physics, which you think would be the most empirical of all, is no longer empirical. You think of anything you can really believe is out there, external to your mind. The primary entities out of which all of these things you see are made, are protons and electrons. You discover there are other things smaller than protons and electrons called elementary particles. It turns out the number of elementary particles is proportional to the amount of money we have to build big machines to find more. There are no elementary particles external to the mind of physicists as we would have thought several generations ago. Rather the mental constructs used by the physicists influence the outcomes of their experiments. Now it turns out physicists and Piaget have much in common. Piaget was a person who studied cognitive development and had a view of knowing close to what we do when we actually do physics. That is CE, constructivist epistemology.

INTELLECTUAL EXCITEMENT

The next key ingredient for survival of a Piagetian program, once you have everyone turned into a constructivist epistemologist, is IE. To keep your program alive and well, you must have Intellectual Excitement. Many programs I have seen started as innovations in higher education die out when the intellectual excitement of the people who got it started goes away. You need to think about how you keep your own program intellectually exciting. Let me tell you some things we have done at Nebraska that can serve as models for other people.

First, you have to start exchanging ideas with each other, outside of your own departments and with other people in the program. How do we do that? At Nebraska when we write a Learning Cycle we want to try out on our students, we bring it to an ADAPT staff meeting and try it out on the other faculty members.

People in English are without mercy when I try to do a physics learning cycle with them. I am the same way when they try to get me to translate poetry. It is very helpful. We get a chance to talk about our teaching plans before using them with students. That is good and exciting.

Another thing we have done is write workshop materials. All of you have been through a workshop, I think. Every workshop has modules in which you analyze textbooks or exam questions. Have you ever sat down with those materials and your own test and written a page you might use in a workshop? Or analyzed a section of your text and shown it to other people in your program? We just finished modifying our workshop materials. It created a lot of discussion and havoc in our ADAPT faculty.

Another way is to get on the telephone and call up the other people in the COMPAS network in the same disciplinary area that you are and swap stories and find out what they are doing. That is one way, exchanging ideas, to maintain intellectual excitement of the group.

We have benefited from reading the Piagetian literature. Piaget wrote so many articles it is nearly impossible to read all his works. Also he is difficult to understand. He wrote in French, and the people who translate into English do not always understand his epistemology. Now many people are doing things with the ideas of Piaget, and those articles are accessible to most of us. The ADAPT group has taken an institutional membership in the Jean Piaget Society of the U.S.A. It puts out a small booklet, publishes articles and holds an annual conference. If you are an institutional member, they will send four different copies of their journal to you. Then people can keep up-to-date with what is going on in the Piagetian literature. The JPS also publishes books. Here is one that is very nice -- The Impact of Piagetian Theory on Education, Philosophy, Psychiatry, and Psychology.[7] There are many resources in which we can find articles related to the ideas of Piaget and teaching. The Jean Piaget Society has a meeting every May in Philadelphia, so if you live near there, you could go to that meeting.

We have also found it extremely beneficial to have a Piagetian scholar in our group. Since the beginning of our program, we have had an educational psychologist whose area of interest was in formal operations, who read the Piagetian literature, who sent us his/her reprints and preprints, and who kept us advised of what is going on in Piagetian circles. He serves as a kind of "priest" to our "religious movement." He keeps us close to the original scriptures, not letting us wander too far afield. I don't know how you get such a scholar if you don't have one. You may have to recruit a psychologist and get him/her to read Piagetian literature.

A fourth thing we have done to maintain intellectual excitement is to conduct faculty development seminars on our own campus as well as on other campuses. There is nothing quite like going out into the bushes to convert the heathen with your ideas and your own material

and have them confront your ideas with their own as a way of challenging yourself to think more profoundly and more deeply about what you really believe and really think is important. It is a way of offering your ideas for the evaluation of others and a way to bring new faculty members into your program. Recruiting new faculty is an important aspect of every program. You need to think about ways of doing that.

SUPPORTIVE COMMUNITY

The final key to survival is a Supportive Community -- SC. From the beginning of the ADAPT program we have had a weekly staff meeting. A group of about 12 people on our campus have been involved in teaching in our program at one time or another. Only three people are actually teaching in the program at any one time. We hold a weekly staff meeting, usually a brown bag lunch meeting. From eight to 15 people come to that meeting. People who are not now teaching in the program still participate. Some haven't taught in the program for three years but are still emotionally involved, vested in the ADAPT program, and part of our supportive community. We talk about all kinds of issues. It usually doesn't degenerate into campus politics. What has brought us together is our concern about learning and teaching students. Those issues almost always come up. It is a tremendously exciting group and a very worthwhile experience for everyone. The reason this is important is that most universities do not recognize that faculty members themselves develop and change. The fact that faculty can grow and develop needs to be affirmed by some group. You need to have colleagues say, "That's all right." You have to have an opportunity to belong to a supportive community. I don't think once a month is often enough, not for us. Nearly all the people in the physics department think I'm committed to the wrong values.

How do I continue to work in an environment when there is one "Fuller" and 26 other physicists? If I am going to survive, I have to have some community of people on my campus that are committed to the same kind of values. I cannot stress this too much. I see it as a key element in the ADAPT program. Six years now and we do fantastic things as a group. Our people in humanities are beginning to write puzzles like the Algae Puzzle, the Mealworm Puzzle, the Frog Puzzle, in composition and poetry. No one else in the country is doing it. You are not very far from the edge of scholarship when you get into a Piagetian program of teaching because no one really knows very much about it. It is exciting. So you need that supportive community.

With growth comes pain. It is not easy to give up ten years of drill and practice in algebra and trig when you suddenly realize all the students are doing is memorizing rather than learning. To get some new idea and try to implement it involves pain. This group of faculty has to be willing to share the pain of growth not only for each

other but also for the students. We believe formal reasoning is greatly desired, but students have gotten to college by memorizing nearly everything. Now you confront them with a course in which memorization is not rewarded. It is a very threatening environment for them. Too often faculty members are not sensitive to the pain caused in students. In fact, being involved with a lunatic group like these Piagetians is painful to some professional people. In the first year of the ADAPT program, six of us were teaching, three of us had Distinguished Teaching Awards from the University of Nebraska, and all of us got less than the average pay raise in our departments! Why? Because we were investing professional energy in ADAPT and not writing papers about elementary particle physics or whatnot. We needed to be a group of people who got together and were willing to share in the transformation of our understandings of what it meant to be college professors and how students went about knowing things.

While the tactics we use are important to our survival, no tactic will work without the three key elements:

(1) being constructivists in our view of knowing,

(2) being intellectually excited about what we are doing, and

(3) being a community supporting one another.

On this journey into the future, these three are essential if we are going to survive the 1980s.

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[2]Ibid., p. 1.

[3]Ibid., p. 2.

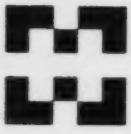
[4]Ibid., p. 3.

[5]Ibid., p. 4.

[6]Ibid., p. 5.

[7]F. B. Murray, (ed.) The Impact of Piagetian Theory on Education, Philosophy, Psychiatry, and Psychology, University Park Press, Baltimore, 1979.

[8]Piagetian Programs in Higher Education, ADAPT, 1981, Available from ADAPT, 110 Ferguson Hall, University of Nebraska-Lincoln, NE 68588.



7

APPENDICES

PIAGET IN A NUTSHELL

BY ROBERT KARPLUS

Two concepts of Piaget that are most helpful to college teachers are: (1) sequences or levels in the development of reasoning and (2) self-regulation (equilibration). Reasoning abilities develop gradually and sequentially and always from less effective to more effective levels.

The second key idea, self-regulation, refers to a process whereby an individual's reasoning advances from one level to the next. This advance in reasoning is always from a less to a more integrated, differentiated and better adapted level. Piaget views this process of intellectual development as analogous to the differentiation and integration one sees in embryonic development. It is also seen as an adaptation analogous to the adaptation of evolving species. The process of self-regulation is discussed in the appendix on the Learning Cycle.

Piaget characterizes human intellectual development in terms of four major stages. The first two, called sensori-motor and pre-operational, are usually completed before a child is seven or eight years old. The last two, however, are of particular interest to college teachers; they are called the stages of concrete operational thought and of formal operational thought. What follows are some reasoning patterns that constitute important aspects of concrete thought and formal thought.

Concrete Reasoning Patterns:

C1 Class Inclusion. The individual understands simple classifications and generalizations (e.g., all dogs are animals; only some animals are dogs).

C2 Conservation. The individual applies conservation reasoning (e.g., if nothing is added or taken away, the amount, number, length, weight, etc., remains the same even though the appearance differs).

C3 Serial Ordering. The individual arranges a set of objects or data in serial order and establishes a one-to-one correspondence (e.g., the youngest plants have the smallest leaves).

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Additional information on Piaget, including workshop material, may be obtained from: Dr. Robert Karplus, Lawrence Hall of Science, University of California, Berkeley, California 94720.

These basic reasoning patterns enable the individual to:

(a) understand concepts and simple hypotheses that make a direct reference to familiar actions and objects, and can be explained in terms of simple associations (e.g., the plants in this container are taller because they got more fertilizer);

(b) follow step-by-step instructions as in a recipe, provided each step is completely specified (e.g., can identify organisms with the use of a taxonomic key, or find an element in a chemical solution using a standard procedure);

(c) relate his/her viewpoint to that of another in a simple situation (e.g., a girl is aware that she is her sister's sister).

However, individuals whose reasoning has not developed beyond the concrete level have certain limitations in reasoning ability. These limitations are demonstrated as the individual:

(d) searches for and identifies some variables influencing a phenomenon, but does so unsystematically (e.g., investigates the effects of one variable but does not necessarily hold the others constant);

(e) makes observations and draws inferences from them, but does not consider all possibilities;

(f) responds to difficult problems by applying a related but not necessarily correct algorithm;

(g) processes information but is not spontaneously aware of his own reasoning (e.g., does not check his/her own conclusions against the given data or other experience).

The above characteristics typify concrete operational thought.

Formal Reasoning Patterns:

F1 Combinatorial Reasoning. The individual systematically considers all possible relations of experimental or theoretical conditions, even though some may not be realized in nature.

F2 Propositional Reasoning and the Control of Variables. In establishing the truth or falsity of hypothesized propositions, the individual recognizes the necessity of taking into consideration

all the known variables and designing a test that controls all variables but the one being investigated (e.g., in the Mealworm Puzzle, recognizes the inadequacy of the setup using Box 1).

F3 Proportional Reasoning. The individual recognizes and interprets relationships between relationships in situations described by observable or abstract variables (e.g., the rate of diffusion of a molecule through a semi-permeable membrane is inversely proportional to the square root of its molecular weight; for every 12 banded frogs there are a total of 72 frogs, therefore, for every 55 banded frogs there must be a total of 330 frogs).

F4 Probablistic Reasoning. The individual recognizes the fact that natural phenomena themselves are probabilistic in character and that any conclusions or explanatory model must involve probabilistic considerations (e.g., in the Mealworm Puzzle the ability to disregard the few mealworms in the "wrong" ends of boxes I, II, and IV; in the Frog Puzzle the ability to assess the probability of certain assumptions holding true such as: the frogs mingled thoroughly, no new frogs were born, and the bands did not increase the death or predation rate of the banded frogs).

F5 Correlational Reasoning. In spite of random fluctuations, the individual is able to recognize causes or relations in the phenomenon under study by comparing the number of confirming and disconfirming cases of hypothesized relations with the total number of cases (e.g., to establish a correlation of, say, blond hair with blue eyes and brunette hair with brown eyes, the number of blue-eyed blonds and brown-eyed brunettes minus the number of brown-eyed blonds and blue-eyed brunettes is compared to the total number of subjects).

These reasoning patterns, taken in concert, enable the individual to accept hypothesized statements (assumptions) as the starting point for reasoning about a situation. He is able to reason hypothetico-deductively. In other words, he is able to imagine all possible relations of factors, deduce the consequences of these relations, then empirically verify which of those consequences, in fact, occurs.

At the concrete operational stage, these reasoning patterns are not absent; however, they are only intuitively understood. Hence they are applied only in familiar situations, only partially and unsystematically. One can be said to be reasoning at the formal level when these patterns have become explicit and useful as general problem-solving procedures.

In the table on the next page, we summarize the most important differences between concrete and formal thought.

CHARACTERISTICS OF CONCRETE AND FORMAL OPERATIONAL THOUGHT

CONCRETE THOUGHT	FORMAL THOUGHT
Needs reference to familiar actions, objects, and observable properties.	Can reason with concepts, relationships, abstract properties, axioms, and theories; uses symbols to express ideas.
Uses reasoning patterns C1 - C3. Patterns F1 - F5 are either not used, or used only partially, unsystematically, and only in familiar contexts.	Uses reasoning patterns F1 - F5 as well as C1 - C3.
Needs step-by-step instructions in a lengthy procedure.	Can plan a lengthy procedure given certain overall goals and resources.
Is not aware of his own reasoning, inconsistencies among various statements he makes, or contradictions with other known facts.	Is aware and critical of his own reasoning; actively seeks checks on the validity of his conclusions by appealing to other known information.

The college teacher who is interested in applying these ideas in his teaching should be aware that many theoretical and experimental issues relating to the theory are still being investigated. Piaget's original notion was that all persons progress through the major levels in the same, invariant sequence, though not necessarily at the same rate. Yet recent studies suggest strongly that, although almost everyone becomes able to reason well with concrete reasoning patterns, many people do not come to use formal reasoning patterns effectively.

Since the above reasoning patterns that have been described as formal represent extremely worthwhile educational aims, and indeed are fundamental to developing meaningful understanding of theoretical and complex disciplines, the finding that approximately 50% of college freshmen in this country do not effectively employ formal reasoning patterns in a great many areas presents a real challenge.

In addition to this finding, five further points regarding concrete and formal level thought should be kept in mind by teachers. First, formal thought is more than this or that specific behavior. It is also an orientation towards approaching and attempting to solve problems. For this reason, a person who is confident and experienced in one area may reason hypothetico-deductively (formally) in that area, but may be unwilling or unable to generate hypotheses and reason flexibly in a threatening or unfamiliar area. Second, a person's ability to effectively deal with problems using formal thought is really open-ended in that he may deepen and broaden his understanding in a particular domain, and/or add new intellectual areas within which he can reason formally. Third, many persons demonstrate the use of reasoning patterns which seem to be a mixture of concrete and formal types when solving particular problems. This type of reasoning can perhaps best be termed transitional. Fourth, a person develops formal reasoning patterns only through the process of self-regulation. Concrete reasoning patterns involving class inclusion, serial ordering, and conservation about real objects, events, and situations are prerequisites for the development of formal reasoning patterns. Fifth, sometimes by applying memorized formulae, words or phrases, students can appear to be reasoning formally and/or be comprehending formal subject matter, when they are in fact not.

Although this essay has not touched on many aspects of Piagetian theory, we will briefly mention its major implications for college teaching.

The theory's major implications for college teaching are:

1. Be aware that some of your students use predominantly concrete reasoning patterns.

2. Be aware that many of the topics and concepts you teach require formal reasoning. You should know which topics those are.

3. Sequence subject matter so it follows the natural progression of familiar to less familiar and more abstract.

4. Demonstrate to your students a questioning and reflecting attitude towards the course you teach. Generate hypotheses, discuss alternative explanations and encourage your students to do the same. Turn your classroom into a laboratory where real problems are investigated and knowledge is derived from the evidence that is produced. Rewarding this type of activity by your students helps students (i) realize that many statements are hypotheses, rather than facts, (ii) reflect upon the meaning of these hypotheses, (iii) examine alternative hypotheses, (iv) examine evidence and its meaning and develop formal patterns of reasoning.

THE LEARNING CYCLE MODEL*

Piaget has identified four major factors which he believes relevant to the development of cognitive reasoning abilities. These factors are:

1. Maturation -- Students must be biologically mature and physically developed and therefore capable of operating physically in their environments.

2. Experience -- Students' past concrete experience and the ability to recall these experiences are critical for further development. Piaget outlines two types of experience: Physical Experience (drawn directly from objects) and Logical-Mathematical Experience (drawn by actions which affect objects).

3. Social Communication -- Students must be capable of communicating information via written and oral language.

4. Equilibration -- For cognitive growth, students must be supplied a situation of cognitive challenge where their existing mental operations are not adequate. The accommodative process (called equilibration) by which the student deals with this new information will result in cognitive growth.

A translation of this Piagetian theory into a workable model for designing learning experiences should incorporate each of these factors. When applied to adolescent students, factors one and three are probably not as important as factors two and four. Piaget himself stressed the interdependence of all four factors but suggested factor two and its proper relation to factor four are fundamental to learning and development.

For this research problem, the Learning Cycle will be divided into three major segments: exploration, concept invention and concept application. The following is an overview illustrating the important general characteristics of each phase.

* *Reprinted from unpublished dissertation, "An Evaluation of A Learning Cycle Intervention Strategy For Enhancing the Use of Formal Operational Thought."*
T. Campbell, University of Nebraska, 1977. (Pages 36-46).

Exploration

Following a brief statement of topic and direction, students are encouraged to learn through their own experience. Activities may be supplied by the instructor which will help the students recall (and share) past concrete experiences or assimilate new concrete experiences helpful for later invention and/or application activities. During this activity, the students receive only minimal guidance from their instructor and explore new ideas spontaneously.

Emphasis -- Concrete experience

Focus -- Open-ended student activity

Function -- Student experience is joined with appropriate environmental disequilibrium.

1. This phase of the Learning Cycle provides students with reinforcement of previous concrete experience and/or introduces them to new concrete experience related to the intended outcome objectives.

2. The activity allows for "open-ended" considerations, encouraging students to allow concrete experiences to evoke non-concrete ideas as possible relevant factors.

3. During the exploration activity, the instructor supplies encouragement and hints and/or suggestions to maintain an appropriate level of disequilibrium.

4. This activity provides the instructor information concerning the students' ability to deal with the concepts and/or skills being introduced. In addition, the students will reveal the reasoning skills which they may evoke in searching for the solution to a problem.

Concept Invention

In this phase, the concrete experience provided in the exploration is used as the basis for generalizing a concept, for introducing a principle, or for providing an extension of students' skill or reasoning. Student and instructor roles in this activity may vary depending upon the nature of the content. Generally, students should be asked to "invent" part or all of the relationship for themselves with the instructor supplying encouragement and guidance when needed. This procedure allows for students to "self-regulate" and therefore move toward equilibrium with the concepts introduced.

Emphasis -- Generalization of concrete experiences to abstract possibilities

Focus -- Student's active involvement with instructor for generalization

Function -- Student self-regulation and equilibration of generalized concepts and/or skills

1. During the invention activity, students are encouraged to formulate relationships which generalize their ideas and concrete experiences.

2. The instructor acts as a mediator in assisting students to formulate these relationships so as to be consistent with the outcome objectives.

Concept Application

The application phase of the Learning Cycle allows each student an opportunity to directly apply the concept or skill learned during the invention activity. This activity allows additional time for accommodation required by students needing more time for equilibration. It also provides additional equilibrating experiences for students who have already accommodated the concepts introduced.

Emphasis -- Relevant use of generalized concepts and/or skills

Focus -- Directed student activity

Function -- Further equilibration through broadening concrete experiences

1. To begin the application activity, students and instructors interact in planning an activity for applying the "invented" concept and/or skill in a situation relevant to the instructional objectives.

2. Finally, students are asked to complete the designed activity to the satisfaction of the instructor. While this extending activity allows students to directly apply the invented concept to a new situation, the broadening nature of the activity provides for further equilibration of new cognitive abilities.

Although the Learning Cycle allows each student the opportunity to think for himself, the instructor must be an ever-present "overseer" of the activity, and by providing probing questions, hints, and encouragement keep the activity going. Yet the instructor must guard against overplaying his role as director and planner.

STRENGTHS AND WEAKNESSES OF COMPAS PROGRAMS

At the conclusion of the COMPAS program, one and one-half years after the initial workshop at Illinois Central, the faculty was again brought together to share their experiences. At this meeting, time was set aside for the faculty to determine the strengths and weaknesses of the programs at their schools. Their responses have been compiled in this appendix.

STRENGTHS OF COMPAS PROGRAMS

1. In your experience, what were the major strengths attributed to using the Learning Cycle model of instruction?

   Fostered deeper understanding of content.

   More student involvement in the learning process.

   Created atmosphere conducive to open communication.

   Encouraged instructor to focus more on process as well as content.

   Promoted more creativity and ingenuity on part of student.

   Instructor forced to clarify the learning goals.

   Emphasis on the thinking process.

   Made students responsible for learning.

   Informality -- students comfortable to ask questions.

   Change of evaluation to written expression, as opposed to all objective questions.

   Group identity for students.

   Interdisciplinary experiences for students and faculty.

2. What positive feedback did you receive from project students which relate to strengths of your program?

   Greater depth of understanding.

   Atmosphere of openness, rapport between student/instructor.

   Interdisciplinary benefits -- students saw relationships among fields.

Higher interest level.

Could see relationship of content to "real world."

Provided support for "high anxiety program;" (students) "eased" into school.

Emphasis on thinking skills very helpful.

Lower attrition.

Classmates became friends; students still in contact after classes finished.

Students brought in examples of thought decoding.

3. What positive comments concerning your program did you receive from colleagues?

Counselors felt there was "a place" to put students with specific needs.

Good administrative support.

A lot of questions.

"Would like to get involved" sometime.

Heightened awareness -- got lots of mail about program.

Impressed by retention and by interdisciplinary model.

4. What were the major strengths of the programs at your institution?

Close faculty contacts.

Cross-discipline interaction.

Channeled energies of good teachers, provided opportunity for teacher growth.

Self-evaluation on the part of teacher -- forced you to look at your discipline and your techniques.

Student/teacher interaction increased.

High retention rate of students.

Made instructors reorganize their courses.

Instructors forced to look from students' point of view.

Block scheduling.

Excellent recruitment.

WEAKNESSES OF COMPAS PROGRAMS

1. In your experience, what were the major weaknesses attributed to using the Learning Cycle model of instruction?

   Preparation of materials too time-consuming.

   Problem of reducing content and the implication for transfer courses.

   Anxiety and frustration often too high.

   Difficulty of finding good tools for evaluation: standard tests not always appropriate.

   Problem of turning work in on time.

   Expectation of students' behavior and learning cycles too high.

   Students preferred to be told rather than discover for themselves.

   Students with introverted personalities might be at a disadvantage.

   A lot of work on instructors' part.

   Some groups finished early; not all completed at one time.

   Students become closely knit, too much purely social, non-academic interaction.

   Never sure if the things on paper were actually learned.

2. What negative student feedback did you receive which relates to weaknesses of your program?

   Students often complained about testing as being too traditional.

   Students resented carrying others, since not everyone contributed equally.

   Amount of work too heavy.

   Some students felt like "guinea pigs."

   Some students had problems talking to the entire class.

   Good students disliked irresponsible students who asked for too much help.

   Some students did not like the instructor knowing so much about them.

   Some students complained about being with the same students in all their classes.

   Some students wanted the traditional classroom activities.

3. What negative comments concerning your program did you receive from your colleagues?

"Hope you guys are not the only ones who can teach people to think."

Jealous of travel.

Made fun of project.

Some faculty saw it as a remedial program for slow learners.

Losing of some content.

Too noisy.

Many faculty felt left out.

4. What were the major weaknesses of the programs at your institution?

Student selection process.
Hard to explain program to students.
Not enough students for all classes.
Selection of marginal students difficult if they do not wish to work.

Lack of publicity and awareness of program.

Problem of filling second semester in a full year program.

Lack of time to coordinate with colleagues.

Lack of follow-up.

Lack of administrative support.

Must sacrifice content in classes.

Students realized other courses were often easier, and they tired of the extra work.

Project COMPAS* Newsletter

*Funded by the Fund for the Improvement of Postsecondary Education

Illinois Central College
*DOORS Program

Community College of Allegheny Co.
*Project LIFT

Joliet Junior College
*Project STEPPE

Prairie State College
*Project RISE

Seminole Community College
*Project STARS

Surry Community College
*Project CREATE

William Rainey Harper College
*Project PATH

EXCERPTED FROM APRIL, 1980, NEWSLETTER

Are any of you still struggling with organizing your course for next fall? Having trouble with exploration activities? How about developing application exercises? Any of you waking up at 2 a.m. in a cold sweat, realizing that there is a possibility that you could be a different classroom teacher next fall?

Well, if these questions pertain to you, don't feel that you are alone. You have company! These concerns were common at all of the schools we visited. We found a lot of thinking, pondering, questioning, and hard work going on. True, some individuals are finding the going tougher than others. We tried to offer some help and advice in our meetings with individual instructors. In our general sessions, we tried to encourage individuals to help each other through some of the rough time. It is important to remember that people in other disciplines can be of great help. We also encouraged the site directors to create an atmosphere in the weekly sessions where this kind of give and take can occur.

We had an opportunity to meet with various administrators, counselors, department chairpersons, etc. These meetings appeared to be informative and helpful. I only hope that we were successful in explaining the purpose of the various programs and what the individual faculty members are attempting to do.

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*Project CREATE

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*Project PATH

EXCERPTED FROM MAY, 1980, NEWSLETTER

SHARING LEARNING CYCLES

Having personally visited all of the schools, I still see a great reluctance to share materials with other members of the project. The prevailing attitude seems to be that the learning cycles are not good enough or are not in their finished form. Several individuals have indicated that they would be willing to talk over certain things, but were unwilling to have someone look at the materials when they were not present to defend them.

I guess I can identify with this feeling, because I felt the same way. I had the feeling that my materials were the weakest in the DOORS Program. It always seemed that everyone else had better ideas than I did. I just about died when Tom asked us to send him copies of our learning cycles to keep on file and to send out when he received requests.

The point I am trying to make is that many of you have developed some good materials and come up with good ideas that could help others in the COMPAS Project. It is just a shame that these materials and ideas are not being shared so that everyone could benefit. I think it is important to realize that everyone feels the same way and that all of you are facing similar problems.

ADMISSIONS UPDATE

illinois central college

DOORS PROGRAM TO CONTINUE

The successful program at ICC called the Development of Operational Reasoning Skills (DOORS) will be offered to incoming students for the Fall Semester of 1981. The program description and a list of the classes is printed on the reverse side of this page.

Evaluation of the DOORS program has been encouraging. DOORS students enjoy the program and feel that it is a good way to begin a college career. Students in the program are assisted in development of thinking skills and strategies. As a result, DOORS students have been more successful than other beginning students in completing their initial college classes.

DOORS students heartily recommend the program to new students. Here is what some of them say.

> "DOORS is something every freshman should get into. It gives the student a better insight into college and lets him discover new ways of learning and developing his reasoning skills. It has helped me in getting to know the students as well as the instructors and has given me a better insight into college."

> "Overall I believe that the DOORS program is a success. It is beneficial to the incoming freshman as well as the older student. For the student who wants to learn but can't decide on a major, this program will open doors."

> "The DOORS program will provide you the once-in-a-lifetime opportunity to start off on the right foot at the very beginning of your college career, and it will secure for you the foundation you will need in your future course of study."

Even though DOORS classes carry full transfer credit, many misconceptions concerning the nature and objectives of the program have developed since the program began in 1976. These range from "DOORS is a remedial program," to "To enroll in DOORS you must qualify for financial aides." With the experience with the students who have taken DOORS, we can begin to pinpoint many of the characteristics of students who can best be served by the program. A list of general characteristics of these students is given below.

1. Marginal Ability - Students who have low high school grades and low entrance scores make good candidates if they qualify for the college transfer level programs.

2. Under-Achiever - Students who show promise through exam scores but did poorly in a traditional high school curriculum. The non-traditional, active involvement and change in emphasis made in the program produces motivation in these students.

134

3. No Definite Career Goals - Students who desire a college transfer curriculum but are uncertain about their vocational choice. The interrelated courses helps them view one discipline from the standpoint of another.

4. Older Returning Student - Although beginning college students, these older students have completed high school several years ago. Many of these type students are apprehensive about starting back -- most are unsure about their academic abilities.

THE DOORS* PROGRAM

DOORS offers a special opportunity to students beginning their college careers. This semester, the DOORS program will consist of four specially designed courses. Content from these courses is closely interwoven and relates to the personal experiences of the student. The purpose of the DOORS program is to aid students in developing sound reasoning skills while presenting relevant information and insights into several disciplines.

ADVANTAGES

Explore many fields of study while starting your college work.

Meet in informal classes utilizing your past experiences to the fullest extent.

Share several of your classes with some of the same students and get to know them personally.

Enroll in courses that fit together and build toward a common goal.

We encourage all students enrolling in the DOORS program to take all four DOORS courses. DOORS students may select other courses offered by the college, adjusting their course load to meet their individual needs.

The DOORS program for the Fall 1981 semester is as follows:

Department	Crs.No.	Sec.	Sem.Hrs.	Time	Days	Bldg.	Rm.	Instructor
Political Science	115	DO	3	9:00- 9:50	MWF	I	303A	Wysocki
Philosophy	110	DO	3	10:00-10:50	MWF	I	130A	Matthews
Social Science	110	DO	3	11:00-11:50	MWF	I	309A	Thompson
English	110	DO	3	1:00- 2:15	MW	I	234B	Mehl

Students may enroll in the DOORS program or obtain more information concerning the program by phoning 694-5330. TELEPHONE REGISTRATIONS WILL NOT BE ACCEPTED.

DOORS is a new and unique way to begin your college career. All the classes are coordinated and stress an experimental approach to learning. In DOORS classes you will be an active participant in learning through your own experience.

*DOORS stands for Development of Operational Reasoning Skills.

. . . STEPPE . . .

into your FUTURE!!

The STEPPE Program

STEPPE is a unique program for beginning Joliet Junior College students. The STEPPE program consists of five specially designed courses. Content from these courses is closely interwoven and relates to the personal experiences of the student.

As a STEPPE student you may select from a core of five courses. Credit earned in these courses will apply to the general education requirements for an Associate in Arts and Science degree.

STEPPE Forward

STEPPE offers a comprehensive and coordinated introduction to the College Transfer Program. Using an innovative instructional technique, the STEPPE courses will aid students in developing sound reasoning skills while presenting relevant information and insights into several disciplines. Students who are exploring career opportunities as well as those who have already selected a major field will find the STEPPE program a refreshing and ideal way to begin their college career.

Advantages

Explore many fields of study while starting your college work.

Meet in informal classes utilizing your past experience to the fullest extent.

Share several of your classes with some of the same students and get to know them personally.

Enroll in courses that fit together and build toward a common goal.

STEPPE Courses

The STEPPE program offers beginning college students a wide variety of related classroom experiences. All students enrolling in the STEPPE program are required to take a minimum of three STEPPE classes. STEPPE students may then select from other STEPPE courses or from any other courses offered by Joliet Junior College, adjusting their course load to meet their individual needs.

STEPPE students may select a minimum of three of the following courses:

STEPPE English 101 - learning to think and to write clearly — for all the STEPPE classes.

STEPPE Geography 111 - "Everybody talks about the weather!" — STEPPE students will live it.

STEPPE Math 111 - Useful and interesting math concepts will be explored through experience oriented exercises.

STEPPE Psychology 101 - explore human behavior through experience rather than lecture.

STEPPE Sociology 270 - STEPPE students will be given exercises in doing sociology in the real world rather than just talking about it.

The STEPPE program is limited to a small number of students intending to enroll in the College Transfer Program

If interested write STEPPE across the top of the application.

For further information, call: Will Miner - Ext. 371 or Len Hodgman - Ext. 354.

JOLIET JUNIOR COLLEGE 1216 Houbolt Avenue, Joliet, IL (815) 729-9020

Harper develops program

by JERRY HANSEN

Harper College officials are developing an innovative program they hope will help "high risk" students succeed in college.

It's estimated that half the students who enter college lack the "thinking skills" necessary to do college work. Those who lack the skills and did average or below-average work in high school are considered high-risk students. Helping those students is the goal of a program for which Harper officials are seeking grant funds.

"Thinking skills" are described as the ability to understand concepts and to reason. Students who lack those skills would find it difficult, for instance, to apply mathematical rules to solve equations or to understand concepts found in literature or poetry.

HARPER COLLEGE, along with six other community colleges, has applied for a $70,000 grant to set up courses to help such students survive college. After a year of training, faculty members would offer special sections of their regular courses.

"It would not be a remedial program," said Betty Windham, Harper physics professor who attended special workshops at Nebraska and now heads efforts to set up a similar program here. "Our aim would be to select students who come into college without any definite career goals, who know they want to go to college and who would benefit from the program."

With grant funds, faculty members would develop a core curriculum using principles of Swiss psychologist Jean Piaget.

Piaget's work is used most often to help elementary school children develop learning skills. But a program at the University of Nebraska at Lincoln pioneered using his methods with college students.

STUDIES SHOW that about half the entering college freshmen lack needed thinking skills, Windham said. Above-average students are able to develop the skills on their own, but below-average students, the target group, need special help. Community colleges, with their open admissions policies, face greater problems than four-year schools, she said.

About 30 students would be selected for the Harper program, which would consist of five courses offered during one semester. Students probably would be from the middle third of their high school graduating classes but would lack preparation to do college-level work.

In the core classes, including English, math, physical science, political science and psychology, students would develop such skills as classifying ideas, building relationships and criticizing their reasoning.

For example, in English, students would receive note cards with different parts of poems written on them. Students would group the different parts on their own and then work with the teacher in finding patterns. Finally, students would apply what they learn by writing their own poems.

THE PROGRAM is based on courses developed at Illinois Central College, a community college in East Peoria. During the two years the program has been used, it has helped reduce the dropout rate while also improving grades of students enrolled. Faculty from Illinois Central will help the other schools develop their programs.

Windham now uses some Piaget methods in her classes. "I've noticed definite improvement in the way they handle data in the lab," she said. "And student reaction has been positive."

The full-scale program would begin in September 1980. Students would enroll in special sections of courses now available. The students would take classes together.

"It's a good way to make a group of friends," Windham said.

The program should reduce the dropout rate and might attract students who otherwise would not attend college, said David Williams, vice president for academic affairs. With declining enrollment causing loss of tuition and state aid revenue, school officials are eager to increase enrollment.

Windham expects to learn whether the grant has been approved by June. She is optimistic, though, because the same proposal received favorable comments last year but was rejected pending an evaluation of the Illinois Central program. That evaluation was finished in February.

Reprinted from
The Daily Herald
May, 1981

New program offered to motivate students

by PETE WICKLUND

Harper will soon begin a program to help "high risk" students attain motivation to succeed in college. The program, modeled after the similar one at Illinois Central College (ICC) in East Peoria, will be offered for the first time next fall.

Betty Windham will be the faculty leader for the new program. Miss Windham took a leave of absence last year to observe the program at ICC. Besides Harper, several junior colleges across the country will be starting "high risk" programs at their schools. These schools include Prairie State College in Chicago Heights; Joliet Junior College, in Joliet; Surry Community College, in Dobson NC; Community College of Allegheny County, West Mifflin, Penn.; and Seminole Community College, Seminole Flo.

The "high risk" plan is to develop "thinking skills" in students who did just average or below average work in high school. These "thinking skills" are described as the ability to understand concepts and to reason. "This will not be a remedial program", stressed Miss Windham. The program will be offered to students who believe they want to attend college but are not sure of what direction they would like to take. "Our aim will be to select students who come into college without any definite career plans, who know they want to go to college, and would benefit from the program," said Miss Windham. Approximately 30 students will be chosen for the first of hopefully many of the one semester programs. Harper officials will view the success of the program at the end of the first year.

The "high risk" program will be funded in part by the Department of Health, Education, and Welfare. Miss Windham hopes that after the program's trial run is over that the college will continue the program with Harper funds.

The program will revolve around basic, freshman, "core" classes. Among these will be classes in English, math, physical science, political science, and advanced reading skills. Students will also take psychology 099 (study skills). It will be in the study skills course where teachers and students will meet to discuss the goals and progress of the "high risk" program. All 30 students will be in the same courses together, a measure Miss Windham hopes will put the students more at ease.

The program will be interdisciplinary and according to Miss Windham will stress social interaction between the students. This close interaction between the students hopefully will increase the motivation necessary to do college level work.

The program is largely based on the work of psychologist Jean Piaget. Piaget did much work in the area of mental development in young children.

At the University of Nebraska Piaget's work was applied to college aged students and as a result the "high risk" plan was devised. The program has run at the University of Nebraska for four years. Miss Windham presently uses Piaget tactics in her classes at Harper. The results have been very promising and Miss Windham hopes that other teachers at Harper will begin to use them.

Reprinted from
The Harbinger
November 5, 1979

The CREATE Program

Surry Community College
Dobson, NC 27017
(919)386-8121

PROGRAM FACULTY

Scott Stevens
Site Director
Physics Dept.
Entered Program August, 1979
CREATE Course Taught: Physics

Paula Gupton
Mathematics Dept.
Entered Program August, 1979
CREATE Course Taught: Mathematics

Norwood Selby
English Dept.
Entered Program August, 1979
CREATE Course Taught: English

The DOORS Program

Illinois Central College
Peoria, IL 61604
(309)694-5011

PROGRAM FACULTY

Richard Thompson
Site Director
Social Science
(309)694-5330
Entered Program Spring, 1977
DOORS Courses Taught: Introduction to Social Sciences;
World Civilization

Thomas Campbell
COMPAS Project Director
Administration
(309)694-5525
Entered Program Spring, 1977
DOORS Courses Taught: Foundations of Physics

Rich Hoffman
Physical Science
(309)694-5389
Entered Program Fall, 1979
DOORS Courses Taught: Foundations of Physics

Mary Matthews
English Dept.
(309)694-5526
Entered Program Fall, 1981
DOORS Course Taught: Introduction to Philosophy

Carol May
Behavioral Science
(309)694-5328
Entered Program Spring, 1977
DOORS Courses Taught: Introduction to Sociology

Phil McGill
Mathematics Dept.
(309)694-5378
Entered Program Spring, 1977
DOORS Courses Taught: Concepts of Mathematics

Thoma Mehl
English Dept.
(no longer employed)
Entered Program Fall, 1980
DOORS Course Taught: English Composition

(continued)

The DOORS Program -- Illinois Central College

(continued)

PROGRAM FACULTY

Jimmie C. Miller
Social Science
(309)694-5320
Entered Program Spring, 1977
DOORS Courses Taught: Principles of Macro Economics

Art Moser
Mathematics Dept.
(309)694-5379
Entered Program Fall, 1979
DOORS Course Taught: Concepts of Mathematics

Joyce Orr
English Dept.
(309)694-5349
Entered Program Fall, 1981
DOORS Course Taught: English Composition

Linda Robertson
Program Counselor
Student Services
(309)694-5281
Entered Program Fall, 1981

Karl Taylor
Adult Basic Education
(309)694-5341
Entered Program Spring, 1977
DOORS Courses Taught: English Composition

Jack Teal
Program Counselor
Student Services
(309)694-5151
Entered Program Spring, 1977

Pete Wysocki
Social Science
(309)694-5574
Entered Program Fall, 1981
DOORS Course Taught: American National Government

Karen Zucco
Behavioral Science
(309)694-5329
Entered Program Fall, 1978
DOORS Course Taught: Introduction to Sociology

The PATH Program

William Rainey Harper College
Algonquin and Roselle Roads
Palatine, IL 60067
(312)397-3000

PROGRAM FACULTY

Betty Windham
Site Director
Physics Dept.
Ext. 527
Entered Program Fall, 1978
PATH Course Taught: Physical Science 111

Therese Butzen
Mathematics Dept.
Ext. 232
Entered Program Fall, 1979
PATH Courses Taught: Math 095, Math 120

Nancy Fojo
Program Counselor
Student Development
Ext. 342
Entered Program Fall, 1979
PATH Course Taught: Psy 110 (Human Potential Seminar)

Lee Kolzow
Special Services Division
Ext. 328
Entered Program Fall, 1979
PATH Course Taught: Reading 104

Frank Smith
English Dept.
Ext. 481
Entered Program Fall, 1979
PATH Courses Taught: English 100, English 101

Molly Waite
Social Science Dept.
Ext. 430
Entered Program Fall, 1979
PATH Course Taught: Political Science 201

The RISE Program

Prairie State College
202 S. Halsted
Chicago Heights, IL 60411
(312)756-3110

PROGRAM FACULTY

Glenn Schmitz
Site Director
Science Division
Ext. 274
Entered Program Sept., 1979
RISE Courses Taught: Physical Science

James Herbach
Science Division
Ext. 450
Entered Program Sept., 1979
RISE Course Taught: Chemistry

Don Alexander
Social Science Division
Ext. 208
Entered Program Sept., 1979
RISE Course Taught: Sociology

Kasey Kephart
English Division
Ext. 250
Entered Program Sept., 1979
RISE Courses Taught: English

Pat Faulkner
Social Science Division
Ext. 205
Entered Program Sept., 1979
RISE Course Taught: History

Jim Moore
Social Science Division
Ext. 210
Entered Program Sept., 1979
RISE Course Taught: Psychology

Dale Haywood
Mathematics Division
Ext. 278
Entered Program Sept., 1979
RISE Course Taught: Mathematics

Don Uram
Program Counselor
Ext. 106
Entered Program Sept., 1979

The STARS Program

Seminole Community College
Sanford, FL 32771
(305)323-1450

PROGRAM FACULTY

Alexander K. Dickison
Site Director
Mathematics/Science Division
Ext. 431
Entered Program Sept., 1979
STARS Course Taught: Physical Science

Lucinda Coulter
Social Science Division
Ext. 220
Entered Program Sept., 1979
STARS Course Taught: Economics

Richard L. Detwiler
Mathematics/Science Division
Ext. 204
Entered Program Jan., 1980
STARS Course Taught: Contemporary Chemistry

Robert J. Ek
Business Division
Ext. 291
Entered Program Jan., 1980
STARS Course Taught: Business Law I

Minnie Johnson
Social Science Division
Ext. 242
Entered Program Sept., 1979
STARS Course Taught: Sociology

Bill E. Jordan
Mathematics/Science Division
Ext. 217
Entered Program Sept., 1979
STARS Course Taught: Essential Math

Aimeé H. Mason
Humanities Division
Ext. 276
Entered Program Jan., 1980
STARS Courses Taught: Humanities I
Humanities II

Lawrence A. McAdam
Mathematics/Science Division
Ext. 209
Entered Program Sept., 1979
STARS Course Taught: Introduction to Astronomy & Meteorology

Dorothy Morrison
English Division
Ext. 372
Entered Program Jan., 1980
STARS Course Taught: Fundamentals of English

Leora Schermerhorn
English Division
Ext. 376
Entered Program Sept., 1979
STARS Course Taught: English I

Anna Wilcox
Program Counselor
Student Development, Ext. 282
Entered Program Sept., 1979
STARS Course Taught: Career Exploration

Stephen C. Wright
English Division
Ext. 397
Entered Program Sept., 1979
STARS Course Taught: English II

The STEPPE Program

Joliet Junior College
1216 Houbolt Avenue
Joliet, IL 60436
(815)729-9020

PROGRAM FACULTY

Wilbur A. Miner
Site Director
Physical Science Dept.
Ext. 371
Entered Program Sept., 1979

James Cooper
Mathematics Dept.
Ext. 372
Entered Program May, 1981
STEPPE Course Taught: Math for General Education

Leonard Hodgman
Physical Science Dept.
Ext. 363
Entered Program Sept., 1979
STEPPE Course Taught: Physical Geography

Gilbert M. Nicoll
Mathematics Dept.
Ext. 365
Entered Program Sept., 1979
STEPPE Course Taught: Math for General Education

Philip Piket
Social Science Dept.
Ext. 378
Entered Program Sept., 1979
STEPPE Course Taught: Marriage and the Family

Beverly Shields
English Dept.
Ext. 323
Entered Program Sept., 1979
STEPPE Course Taught: English

Kenneth Warman
Public Service Dept.
Ext. 360
Entered Program Sept., 1979
STEPPE Course Taught: Psychology

SOURCES OF INFORMATION ON PIAGET AND HIGHER EDUCATION

Athey, I. J., and D. O. Rubadeau, eds. Educational Implications of Piaget's Theory. Waltham, Mass.: Ginn-Blaisdell, 1970.

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Piaget, Jean. "Intellectual Evolution from Adolescence to Adulthood." Human Development. Vol. 15 (1972).

Piaget, Jean, and B. Inhelder. The Psychology of the Child. New York: Basic Books, 1969.

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